

**ORDER**

6190.8

ARTS IIA/TPX-42 PROJECT IMPLEMENTATION PLAN



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**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION**


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**Initiated By:** APM-220



## FOREWORD

This order transmits the project implementation plan for the ARTS IIA/TPX-42. It provides guidance and direction for the orderly implementation of the ARTS IIA at all ARTS II and TPX-42 terminal sites. The procedures and responsibilities in this order were developed using current agency directives. This order establishes program management, project implementation policy and responsibilities governing the activities of organizations and also identifies and describes specific events and activities to be accomplished in order to implement the ARTS IIA.

  
James R. Etgen  
Director, Program Engineering  
and Maintenance Service



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## CHAPTER 1. GENERAL

1. PURPOSE. This project implementation plan (PIP) presents overall guidance and direction for the overly implementation of the ARTS IIA at all ARTS II and TPX-42 terminal sites. The plan establishes program management, project implementation policy and responsibilities governing the activities of organizations. The plan also identified and describes specific events and activities to be accomplished in order to implement the ARTS IIA.
2. DISTRIBUTION. This order is distributed to branch level in the Program Engineering and Maintenance, Systems Engineering, Acquisition and Materiel, Air Traffic Operations, and Air Traffic Plans and Requirements Services in Washington headquarters; to branch level at the FAA Technical Center and Mike Monroney Aeronautical Center; to branch level in the regional Airway Facilities and Air Traffic divisions; and to Airway Facilities field offices having ARTS IIA equipment.
3. AUTHORITY TO CHANGE THIS ORDER.
  - a. Authority. This plan is issued under the authority of the Director, Program Engineering and Maintenance Service, APM-1, the Director, Air Traffic Plans and Requirements Service, ATR-1, and the Director, Air Traffic Operations Service, ATO-1. The authority to issue changes to this order is reserved for the Director, Program Engineering and Maintenance Service.
  - b. Applicability. The information contained herein shall be used by FAA offices, services, regions, centers (Mike Monroney Aeronautical Center and FAA Technical Center), terminal sites, and contractor personnel for accomplishing their support of the ARTS IIA implementation activities. The guidance and schedule information contained herein shall form the framework for these organizations in the more detailed planning activities required at the regional and field levels. Deviations from this plan must be approved by the Director, Program Engineering and Maintenance Service, APM-1.
  - c. Durations. The duration of this program shall continue through to the last ARTS IIA or TPX-42 replacement site commissioning.
- 4.-19. RESERVED.



## CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS.

a. The ARTS IIA Upgrade Project and the TPX-42 Replacement Project arose in response to National Airspace System (NAS) Plan objectives for low and medium density airports in the intermediate term. Low and medium density airports are currently served by ARTS II and TPX-42 air traffic control (ATC) automation systems. Satisfying NAS Plan objectives required development and implementation of an ARTS IIA automation system with capabilities previously available only at ARTS III facilities (e.g., Conflict Alert, Minimum Safe Altitude Warning, etc.). UNISYS, referred to hereafter as the Contractor, is currently under contract to develop, manufacture and install the ARTS IIA. Implementation of the ARTS IIA at existing ARTS II sites will require upgrading the ARTS II through installation of an ARTS IIA upgrade kit which includes both newly developed hardware and software. Implementation at TPX-42 facilities will involve physically replacing the TPX-42 systems with the ARTS IIA. The Contractor is currently tasked with manufacturing upgrade kits for installation at existing ARTS II sites and ARTS IIAs for the conversion of TPX-42 sites.

b. Field implementation of the upgrade kits and systems will proceed in a planned sequence of steps that include pre-installation activities, software/hardware installation, integration and change over. Current installation schedules call for the first kit installation to occur at the FAATC (Test and Evaluation Site). With a complete TPX-42 replacement system to follow. In parallel to the systems and kits being delivered to the FAA Technical Center, additional kits and systems have been installed at the FAA Academy to assist in training. After completion of integration and system shakedown testing at the FAA Technical Center, a keysite installation will begin at the Atlantic City TRACON. When keysite testing is completed, ten upgrade kits and three ARTS IIAs will be installed monthly until the final kit and system is installed. See appendix 1, figures 1 and 2 for installation dates.

21. PURPOSE. The improvement of terminal systems is a fundamental objective of the National Airspace System (NAS) Plan. The ARTS IIA contracts satisfy the objectives of the NAS Plan for low and medium-density airports in the intermediate term by adding beacon tracking, Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Training Scenario Generation (TSG), Training Target Generator (TTG), Data Extraction (DE), and Data Reduction and Analysis (DR&A), to the existing ARTS II sites and also upgrading the existing TPX-42 sites with the automated features of an ARTS IIA.

22. HISTORY. In 1974, the FAA awarded the initial contract to Burroughs Corporation to equip seventy airports with ARTS II systems. Today there are 95 systems which control traffic and provide support to the FAA at non-operational sites like the FAA Academy, FAA Depot, and FAA Technical Center. In March 1982 a hardware/software development contract was awarded to SDC, a Burroughs Company to develop the capabilities of beacon tracking, CA, MSAW, TSG/TTG, DE and DR&A. This contract, DTFA01-82-C-10008 ARTS II Enhancement, modified the existing ARTS II software and added a faster processor, additional memory, a memory power supply, a memory management unit, and an aural alarm subsystem. Three prototype units were manufactured, two were retained by Burroughs for further system development and one unit was sent to the FAA Technical Center for software testing. In July 1985, a production and implementation contract, DTFA01-85-C-00040 ARTS II Upgrade, was awarded to SDC, a Burroughs Company, now called UNISYS. This contract off-loads target detection and display refresh processing to newly developed Data Acquisition Device Controller/Processor (DADCP) and Display Device Controller/ Processor (DDCP) boards, respectively. This contract also produces the upgrade kits, systems, spares, training, and documentation required for system implementation.

23.-29. RESERVED.

## CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The ARTS IIA provides the latest in ATC terminal automation capabilities. The terminals' existing radar systems (surveillance and beacon) form the inputs to the ARTS IIA. The system produces computer-generated annotation as overlays on the surveillance radar displays. These annotations include aircraft identification (flight number), visual target position, altitude, and emergency alerts. The ARTS IIA calculates aircraft ground speed, enabling the system to perform target position predictions, minimum safe altitude warnings (MSAW), and conflict alert (CA) predictions. In addition, the system processes and displays controller-generated inputs which include flight plans, hand-offs, and status. Figure 3-1 is a generic functional block diagram of an ARTS IIA. The ARTS IIA is composed of three fundamental subsystems: 1) Decoding Data Acquisition Subsystem (DDAS), 2) Data Processing Subsystem (DPS), and 3) Data Entry and Display Subsystem (DEDS). In a TRACON configuration the DEDS consists of a Radar Alphanumeric Display System (RADS) and/or a Digital Bright Radar Indicator Tower Equipment (DBRITE). If a TRACAB configuration is implemented the DEDS consists of a DBRITE.

NOTE: Although the DBRITE is listed as a DEDS, it is not part of this procurement.

a. DDAS. The DDAS accepts beacon video and antenna azimuth data from the radar. Beacon replies are identified, and the beacon code data is extracted from the beacon video signal. Range information, obtained from the beacon pretrigger, is appended to each extracted beacon code. The radar antenna azimuth is monitored once each beacon radar sweep. Beacon reply information is extracted from the video signal and subjected to further processing for detection of emergency, ident, and garble conditions. These beacon replies, together with range, azimuth, and alarm information, are output to the DPS. The DDAS also provides for a real time display of essential, video target information in the case of a DPS failure.

b. DPS. The DPS accepts valid beacon replies from the DDAS. The new, microprocessor based firmware controlled Data Acquisition Device Controller/Processor (DADCP) performs the beacon input processing function previously resident in the host processor. This beacon input processing function accepts valid beacon replies and declares valid beacon targets. Upon validation, the beacon target reports are transferred to the new host computer, a Computer Automation LSI 2/40, which is a much faster processor

than the old CA LSI 2/20. The new computer processes the valid beacon target reports and invokes beacon target tracking, CA and MSAW software which is now resident on solid state RAM, versus core memory. A new Memory Management Unit (MMU) was required to map a 15 bit logical address to a 22 bit physical address required by the expanded RAM and a battery supply is provided to retain memory for 15 minutes in case of a power failure. Also within the software, is an alert warning function. The function is both visual and audible. The visual alert message is transmitted to the DEDS for display and the audible alert message is decoded on a new buffer board for transmission to the aural alarm speakers. All symbols and characters associated with tracked targets are generated by the DPS. The new, microprocessor based, firmware controlled Display Device Controller/Processor (DDCP) board performs console display refresh from the DDCP local memory, rather than the host computer. The host also contains new software which supports an on-line training capability. This training capability is realized by using the Training Scenario Generator (TSG) and Training Target Generator (TTG) functions. The Data Extraction (DE) function provides the ARTS IIA with the capability to extract target information on-line, and record the data on the magnetic tape unit. The off-line Data Reduction and Analysis (DR&A) function allows the operator to process the data recorded on the magnetic tape. Extraction flexibility is enhanced in both the DE and DR&A functions with the use of filters. The DPS also serves as the interfacility terminal for flight plan information.

c. DEDS. The DEDS is the interface to the operator. It accepts and displays data from the DPS, the operator and the radar. The DPS sends aircraft and tabular data in the form of symbols and alphanumeric characters to the DEDS. In the event of a CA or MSAW alert, an aural alarm speaker unit located near the DEDS is actuated. The operator inputs are provided thru an alphanumeric keyboard, Position Entry Module (PEM) or display filter and control switches. Raw surveillance radar video and raw beacon video information is also provided to the DEDS.

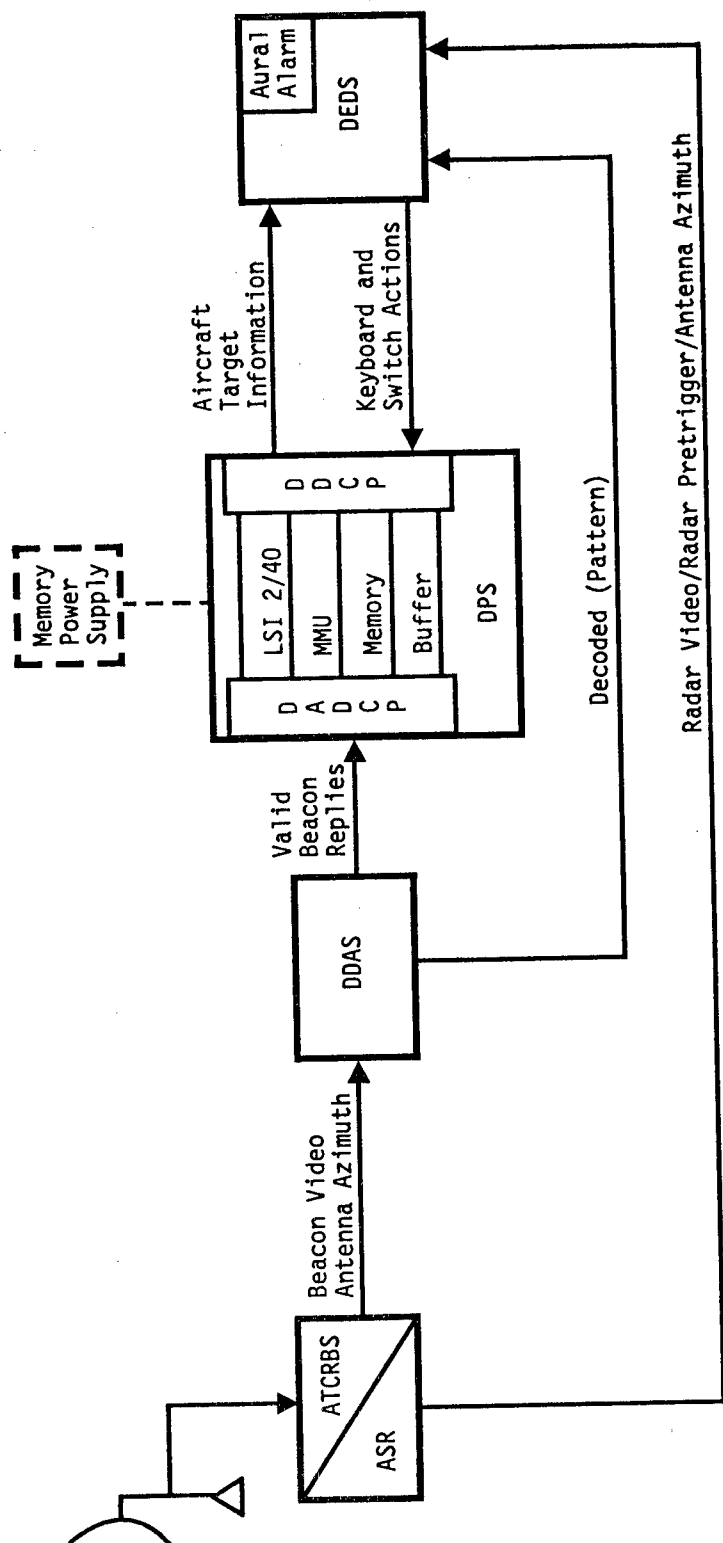


FIGURE 3-1 ARTS IIA FUNCTIONAL BLOCK DIAGRAM

### 31. PHYSICAL DESCRIPTION.

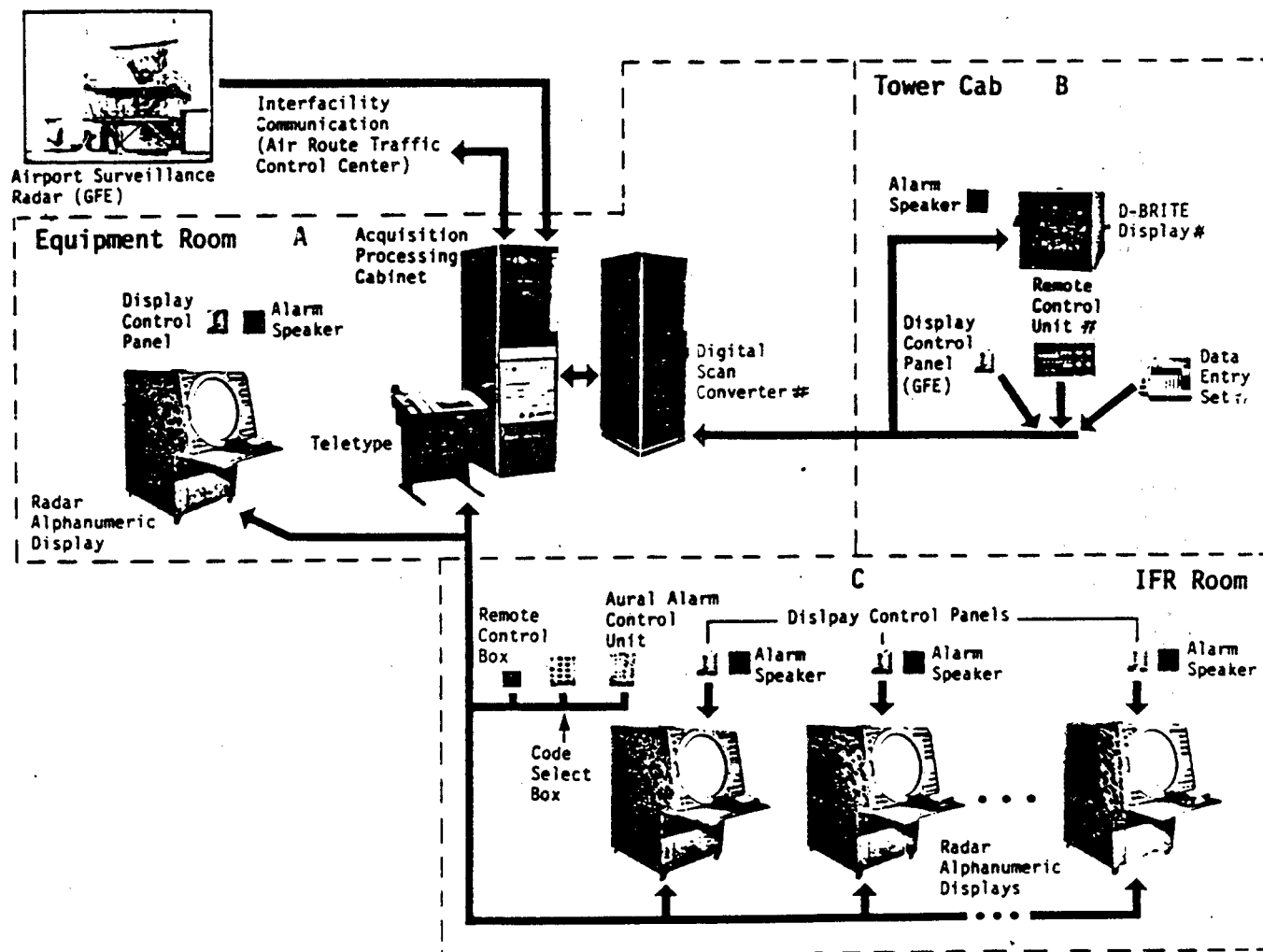
a. System. Replacement of the TPX-42 sites with ARTS IIA systems involves two basic physical configurations, TRACON or TRACAB. Figure 3-2 depicts the equipment required for TRACON or TRACAB configurations. The TRACON configuration consists of areas A, B, and C, and the TRACAB configuration consists of areas A and B. It should be noted that TPX-42, TRACAB configured sites will not receive a RADS display in area A, DBRITES will be provided to fulfill equipment room requirements. Table 3-1 provides a generic list of hardware deliverables and appendix 4 provides a listing of each sites final configuration. Table 3-2 provides major equipment characteristics for a TRACON and a TRACAB configuration. Areas A and C are provided by the contractor. The current method of providing equipment for area B involves the utilization of DBRITES, provided under a different contract and schedule (see chapter 4).

b. Upgrade Kits. The existing ARTS II sites are in a TRACAB or TRACON configuration. Figure 3-3 provides a description of the equipment modifications required for kit installation. Not shown on figure 3-3 is the keyboard and the replacement of key-caps for new keyboard functions. The major equipment characteristics are provided in table 3-2. Hardware for these kits consist of the following:

- (1) Computer (LSI 2/40).
- (2) Memory Management Unit (MMU).
- (3) 256k words of semiconductor RAM memory.
- (4) Buffer (BUF-1).
- (5) Aural Alarm Control Unit.
- (6) Aural Alarm Speaker (one per display).
- (7) Model ASR-4330 teletype for each site location.
- (8) Data Acquisition Device Controller/Processor (DADCP).
- (9) Display Device Controller/Processor (DDCP) (one per display).
- (10) Keyboard key caps for new function keys.
- (11) Assembly and subassembly spares.
- (12) Aural alarm device controller (part of buffer).
- (13) Memory power supply.

32. SYSTEM REQUIREMENTS. Power usage and heat dissipation requirements for the ARTS IIA are lower than the ARTS II. Table 3-3 provides the new electrical and air conditioning requirements associated with major equipment whether it is a new system or an upgrade kit and table 3-4 provides maximum equipment separation distances.





# Provided Under D-BRITE Contract

FIGURE 3-2 ARTS IIA EQUIPMENT

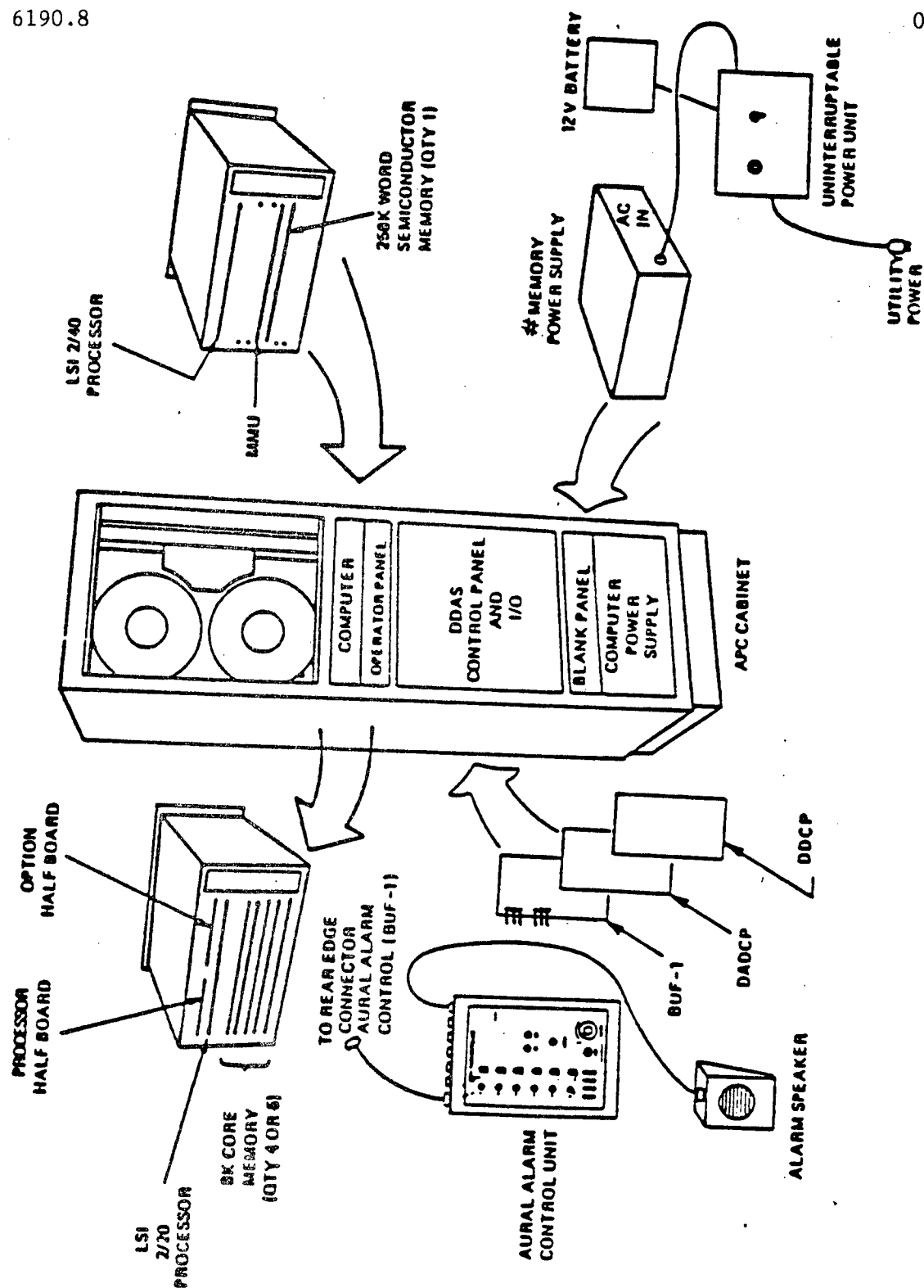
TABLE 3-1. SYSTEM (TRACON/TRACAB) HARDWARE DELIVERABLES

<u>TRACON</u>	<u>TRACAB</u>
Acquisition Processing	Acquisition Processing
Cabinet (APC)	Cabinet (APC)
DDAS	DDAS
DADCP	DADCP
DBG	DBG
ASG	ASG
ADG	ADG
Computer with 256K RAM Memory & MMU	Computer with 256K RAM Memory & MMU
Uninterruptible Memory Power Supply	Uninterruptible Memory Power Supply
Magnetic Tape Unit with	Magnetic Tape Unit with
Device Controller	Device Controller
KDC	Buffer/Aural Alarm Device Controller
Buffer/Aural Alarm Device Controller	DDCP
DDCP	Interfacility Device Controller
Interfacility Device Controller	Card Extender
Card Extender	Display Control Panel
Radar Alphanumeric Displays	Code Select Box
Display Control Panel	Remote Control Box, ATCBI-3, -4, or -5
Code Select Box	Aural Alarm Control Unit
Remote Control Box, ATCBI-3, -4, or -5	Aural Alarm Speakers
Data Entry and Position Entry Module	ASR Teletype
Aural Alarm Control Unit	Input/Output Cable Set (DBRITE)
Aural Alarm Speakers	Assembly and Subassembly Spares
ASR Teletype	
Input/Output and Power Cable Set (RADS)	
Input/Output Cable Set (DBRITE)	
Assembly and Subassembly Spares	

TABLE 3-2. MAJOR EQUIPMENT CHARACTERISTICS

Unit	FAA Designation	Dimensions (Inches)			Estimated Weight (pounds)
		H	W	D	
Acquisition and Processing Cabinet	FA-9021	72	22.5	30	650
Code Select Box	FA-9023	12	10	8	10
Display Control Panel	FA-9024	8	7	5.5	6
Remote Control Box	FA-9022	5	6	5	7
#Digital Scan Converter		72	24	30	150
#Display Unit		19	18.5	27	150
#Remote Control Unit		8	16	4	-
#Data Entry Set		4	8.5	10	10
RAD (including casters)	FA-9030	50	30	54	640
Data Entry and PEM	FA-9032	4	8.5 +2	10	10
ASR TTY	Teletype Corp. Model 4330	31	26	28	70
Aural Alarm Control Unit	FA-10148A	12	12	8	20
Aural Alarm Speakers	FA-10148B	6.25	6.63	3.5	3

#DBRITE equipment, provided under a different contract and project. Dimensions and weights are specification maximums, actual units may be less.



#Memory Power Supply will be located in the blank panel of APC cabinet.

FIGURE 3-3 ARTS IIA KIT EQUIPMENT INSTALLATION

33. INTERFACES. The major ARTS IIA external interfaces are provided below. Changes from the existing ARTS II sites include the addition of Mode S ATC radar beacon and ASR-9 surveillance radar interfaced to the ARTS IIA via a Surveillance Communications Interface Processor (SCIP) at selected sites. TPX-42 Replacement sites have changes in the area of Mode S ATC radar beacon, ASR-9 surveillance radar and SCIP. Implementation of the ASR-9 surveillance radar and the SCIP is the responsibility of the Radar Engineering Division (APM 300), as is the responsibility for the implementation of the Mode S ATC radar beacon. Interface requirements are defined in the External Interface Control Document for: Mode S to ASR-7/ARTS-IIA terminal sites, TM-PA-0018/0072/00-2, Mode S to ASR-8/ARTS-IIA terminal sites, TM-PA-0018/0072/00-1 and the ASR-9 SCIP to terminal computer Westinghouse data item SE007-4.

#### MAJOR ARTS IIA INTERFACES

ATC beacon	ATCBI-3, 4, 5 and Mode S (under development)
ASR radars	ASR-4, 5, 6, 7, 8 and 9 (under development)
Defruiter	FAA-7281 and MX-8757
Radar microwave link	RML-1A, 2, 3, 4S and 6
Beacon performance monitor	Specification FAA-E-2271A
Video mapper	FA-5450A, FA-5400, FA-5100A FA-5450, FA-5100, FA-8049, FA-8970 AN/GPA-131, AN/GPA-30, AN/GPA-91
DBRITE equipment	DBRITE
Interfacility modems	Paradyne Model 2698
SCIP (ASR-9/Mode S)	Under Development

34.-39. RESERVED.

TABLE 3-3. ELECTRICAL/HVAC REQUIREMENTS FOR MAJOR EQUIPMENT

<u>FAA Unit</u>	<u>FAA Designation</u>	<u>Power Data (120 Vac)</u>		<u>Dissipation (BTU/hour)</u>
		<u>Amps.</u>	<u>kVa</u>	
Acquisition and Processing Cabinet	FA-9021	14.0	1.7	5500
Code Select Box	FA-9023	0.2	0.02	75
Display Control Panel	FA-9024	#	#	#
Remote Control Box	FA-9022	##	##	##
Digital Scan Converter####		Not Available		
Display Unit####		Not Available		
Remote Control Unit####		###	###	###
Data Entry Set####		#	#	#
RADS	FA-9030	9.0	1.1	3520
Keyboard and PEM	FA-9032	#	#	#
ASR TTY	Teletype Corp. Model 4330	0.5	0.06	225
Aural Alarm Control Unit and Speakers	FAA-10148A FAA-10148B	0.2	0.02	75
		--	--	--

#Included in RADS

##Included in code select box

###Included in DBRITE

####DBRITE equipment provided under a different contract and project.

TABLE 3-4. MAXIMUM EQUIPMENT SEPARATION DISTANCES

<u>Equipment</u>	<u>Separation</u>
Radar (non-ASR 9/Mode S) to APC	Up to 12,000 feet
SCIP (ASR 9/Mode S) to APC	Up to 4,000 feet
APC to RADS	Up to 500 feet
APC to DBRITE (Digital Scan Converter)	Up to 500 feet
AACU to Speaker	Up to 500 feet



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## CHAPTER 4. PROJECT SCHEDULE AND STATUS

40. PROJECT SCHEDULE AND STATUS. Two project activity schedules are provided. Appendix 1, table 1 depicts activities which have been completed on the upgrade contract. Appendix 1, table 2 provides the reader with insight into the major milestones remaining to complete the project and their relative dates. The activities and dates depicted represent milestones projected by modeling analysis and/or review of the contract requirements. It should be noted the activities on these tables are by no means the all inclusive list of those milestones required for project completion. The uncompleted activities are dynamic and interrelated and are subject to change. Updates to these appendixes will be provided periodically by APM 220.

41. MILESTONE SCHEDULE SUMMARY. Appendix 1, figures 1 and 2 provide installation schedules for upgrade kits and systems, respectively. Per appendix 1, figure 1, first kit installation has occurred at the FAA Technical Center in parallel with the installation of other non-operational sites (FAA Academy and Contractor R&D system in Denver). The two FAA Academy systems have been upgraded to fulfill an early need to train personnel. The Contractor R&D system in Denver has been upgraded to be used as a testbed to correct problems identified during testing. Per appendix 1, figure 2 systems have been provided to the FAA Technical Center with an additional system to the FAA Academy. After the initial phase of personnel are trained, this third FAA Academy system will be sent to the FAA Depot for installation. Delivery of upgrade kits and systems to operational sites will begin in accordance with appendix 1, figures 1 and 2. Updates to these schedules will be provided periodically by APM 220.

42. INTERDEPENDENCIES AND SEQUENCE. A MITRE Corporation study entitled Programmatic Dependencies National Airspace System Plan initially identified the interdependencies associated with the implementation of the ARTS IIA upgrade kits and the TPX-42 replacement sites. Further refinements of the initial plan have been provided by the SEIC through more detailed interdependency analysis. Those interdependencies critical to project completion are the D BRITE and ARTS IIA Interface with Mode S/ASR-9 projects. Appendix 1, tables 3 and 4 provide a site by site interdependency matrix of those sites effected by ASR-9 or Mode S installation. The appendixes are provided in order of implementation and alphabetical order, of expected site deliveries of the interdependent projects. Delivery schedules are dynamic and dependent on various factors. Updates will be provided periodically by APM-220.

a. DBRITE. The Digital Bright Radar Indicator Tower Equipment (DBRITE) Project will replace all current BRITE systems with Digital BRITE (DBRITE) systems which take advantage of digital scan converter technology. DBRITE will also provide displays at qualifying satellite air traffic control towers (ATCT) which presently do not have radar information. At ARTS IIA TRACON and TRACAB facilities, the primary ARTS IIA/controller interface is provided by the Data Entry and Display Subsystem (DEDS). The DEDS will be composed of the Radar Alphanumeric Display System (RADS) supporting the TRACON controller and DBRITE, which provides the tower controller with all of the surveillance radar and alphanumeric information that is available. In the current configuration, the tower controller is supported by a combination of a BRITE system (provides radar surveillance information) and a BRITE alphanumeric subsystem (BANS) which provides alphanumeric information. The interdependency identified between the TPX-42 Replacement Project and the DBRITE Project stems from a discrepancy between DBRITE and ARTS IIA installation schedules. Currently DBRITE schedules will not provide the required DBRITEs in the time for ARTS IIA installation. At ARTS IIA upgrade sites this poses no problem, since the sites can continue using the current BRITE/BANS to support tower controllers. This is not the case at TPX-42 replacement sites which presently do not have BANS. At these sites the BANS functions are performed by the Numerics Generation Conversion Equipment (NGCE) which cannot be used with the ARTS IIA. BANS are not readily available and were not procured for these sites since they will be using DBRITE which eliminates the need for BANS/NGCE equipment. At the present time, a solution to the discrepancy has been reached (see appendix 3). Since both the ARTS IIA and DBRITE installation schedules are dynamic, APM-220 will keep the appropriate offices informed of any changes.

b. ARTS IIA Interface with MODE S/ASR-9. The ARTS IIA will be interfaced to the new ASR-9 surveillance radar and/or the Mode S radar beacon as these new sensor systems are installed at selected ARTS IIA sites. The ARTS IIA must accommodate the following sensor combinations; ASR 7/8 Search with Mode S beacon, ASR 9 Search with Existing ATCBI beacon, ASR 9 Search with Mode S beacon. Currently, the ARTS IIA and the new sensor systems are incompatible. ARTS IIA requires an analog interface, and the new sensors provide a digital output. To ensure compatibility, the ARTS IIA will interface with these new sensors via an Mode S/ASR-9 Line Adapter (MALA). The MALA will be manufactured by UNISYS, under the DTFA01-85-C-00040 Contract, and will be installed in the LSI 2/40 chassis at those sites for which they are required. Seventy-five sites have been designated as needing the MALAs (see appendix 1 tables 3 and 4).

43.-49. RESERVED.

## CHAPTER 5 PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. The overall technical management of the ARTS IIA Upgrade and TPX-42 Replacement projects is the responsibility of the Air Traffic Control Automation Division, APM-200, and in particular, the Terminal Automation Program Office, APM-220. This organization will accomplish management tasks within the guidelines provided by FAA policies, procedures, and directives. A member of this organization is designated Project Manager and is the single focal point for all project activities. The technical officer (TO) position is filled by the designated Project Manager (PM), in APM-220, and provides technical guidance and direction to the contractor within the scope of the contract. The PM will ensure that the contractor has access to technical documentation, appropriate data bases, and sources of information relative to government furnished equipment (GFE). A contracting officer (CO) is designated by ALG-310 to perform the general contract management activities to assure that the terms of performance under the contract are met. The CO is the only person authorized to make changes that will affect prices, deliverables, or schedules.

a. Washington, D.C. The following organizations within FAA headquarters, Washington, D.C. will fulfill the indicated responsibilities required for project implementation:

(1) Program Engineering and Maintenance Service (APM)

(a) Provide technical surveillance of contractor in the design, development, testing, installation, integration, and production of hardware and software for the ARTS IIA contract. Ensure all technical contract requirements are met.

(b) Provide program guidance to all offices, services, centers, and regions on the implementation of the ARTS IIA program. This includes, but is not limited to:

- 1 Site installation.
- 2 Disposition of excess equipment.
- 3 Provisioning.
- 4 Updates to maintenance concept.
- 5 Training.
- 6 Configuration management.

7 Documentation deliverables.  
8 All test phases.  
9 Joint Acceptance Inspection (JAI), Operational Readiness  
Demonstration (ORD), Operations Changeover.

(c) Act as a chairman for working groups established to support the ARTS IIA program.

(d) Manage the interdependencies between the ARTS IIA program and those programs which interface with the ARTS IIA program.

(e) Develop system shakedown test plan and procedures.

(f) Provide membership to the ARTS IIA Configuration Control Board (CCB) and Program Planning Group.

(g) Ensure the availability of funds and keep the contract within budget limitations.

(h) Determine distribution of ARTS IIA hardware documentation.

(i) Provide maintenance support for hardware and diagnostic software after Initial Operational Capability (IOC).

(2) Air Traffic Operations Service (AT0)

(a) Assist in the development of System Shakedown and Operations Changeover plans with APM, regions, and FAA Technical Center.

(b) Ensure that all operational aspects of system implementation are satisfactorily dealt with by the regions prior to Operation Changeover.

(c) Provide technical coordination and support to APM-220 on matters relating to the ATC functions, hardware configuration and operational requirements for interface with associated terminal and/or en route automated systems.

(d) Update the Operations and Procedures Handbooks as may be necessary.

(e) Provide AT Requirements and Resources (ATR-110) with any special training requirements for facility personnel and specialists assigned to regions or sites and the National Terminal Data Systems Branch at the FAA Technical Center.

(f) Provide membership to the Configuration Control Board and Program Planning Group.

(g) Advise APM-220 on the development of ATC operational computer programs.

(3) Air Traffic Plans and Requirements Service (ATR)

(a) Prepare training proposals; reviews and approves all associated ARTS IIA training schedules, assignments, programs and training plans from a technical and operational standpoint.

(b) Instruct and advise regions on training programs, schedules and assignments.

(c) Act as the primary organization for configuration management of ARTS IIA software.

(d) Provide maintenance of operational software programs once development is complete and a coordinated transition to operational control at IOC is effected.

(e) Determine distribution of ARTS IIA contract software deliverables and ship required documentation to the appropriate office.

(f) Provide membership to the Program Planning Group.

(g) Provide membership to the Configuration Control Board.

(4) Systems Engineering and Integration Contractor (SEIC) Project Management. The SEIC provides support in accordance with contract DTFA01-84-C-00017, Chapter 10, NAS Project Management Requirements, and in accordance with contract DTFA01-85-Y-01002, para H.2. These contracts require the SEIC to assist APM-220 with overall management of the project. Specific tasks include:

- (a) Project Planning.
- (b) Subsystem and interface configuration control.
- (c) Project financial management and control.
- (d) Project schedule control.
- (e) Documentation review.
- (f) Logistics support management and analysis.
- (g) Contribution to project reviews and reports.
- (h) Coordination with the ARTS IIA contractor.
- (i) Provide membership to the Program Planning Group.
- (j) Provide membership to the Configuration Control Board.

(5) Acquisition and Materiel Service (ALG).

- (a) Provide support to test manager for conduct of factory acceptance test programs.
- (b) Provide industrial engineering support and production surveillance of program management and contract administration.
- (c) Provide policy and procedural guidance to regional Airways Facilities divisions and the Mike Monroney Aeronautical Center for appropriate ARTS IIA property controls prior to certification.
- (d) Assist APM in providing procedures for the disposal or utilization of surplus materiel.
- (e) Furnish Quality Reliability Officer for in-plant quality and reliability assurance. Provide industrial engineers for test manager/test engineer.
- (f) Provide membership to the Program Planning Group.
- (g) Provide membership to the Configuration Control Board.

b. Field Organizations. The responsibilities of the FAA Technical Center, regions and other field organizations include:

(1) Federal Aviation Administration Technical Center (ACT). Shall provide the support necessary to test and evaluate the project for functional and operational performance and for compliance with the Specification. The FAA Technical Center will perform these duties in accordance with FAA Action Notice, A 1810.1 dated December 31, 1985. ACT-100 will serve as the lead for integration testing. The test representative will coordinate his activities with the Project Manager, APM-220. The FAA Technical Center will also:

(a) Provide membership, as required, to the Configuration Control Board.

(b) Provide ARTS IIA engineering, testing, integration and deployment support to APM and the regions. This support is to be outlined in APM FAA Technical Center task agreements.

(c) Provide operation and maintenance services for the ART IIA.

(d) Maintain the documentation in accordance with FAA Order 1750.6, NAS Documentation Facility, dated June 27, 1967.

(e) Establish initial training requirements for FAA Technical Center personnel and coordinate with ATR-110 and APM-110.

(f) Establish financial and item management control and accountability for all agency property received at FAA Technical Center.

(g) Develop Integration Test Plan and Procedures.

(2) Mike Monroney Aeronautical Center (AAC).

(a) Provide logistic support service and planning.

(b) Accomplish cataloging and provisioning for ARTS IIA equipment.

(c) Provide supplies and working equipment for each facility receiving ARTS IIA equipment.

(d) Provide national project materiel which is not procured by ALG.

(e) Develop, monitor and conduct ARTS IIA training programs as directed by APT-300.

(f) Adapt national engineering specifications to local conditions and perform engineering services within nationally provided guidelines for the installation, inspection and acceptance of the ARTS IIA system, including subsystem components, at the FAA Academy.

(g) Provide engineering feedback to APM-220 for correction of system or equipment deficiencies for the installed ARTS IIA system.

(h) Provide for technical supervision of on site activities performed under the contract at the Mike Monroney Aeronautical Center.

(i) Accomplish preliminary acceptance of items delivered to the FAA Academy under the contract.

(j) Develop, in conjunction with ALG and APM-220 logistics policies and plans for support of the system.

(k) Participate in planning activities for the transition of the system equipment into the logistics inventory.

(l) Participate, as requested by APT-300 in the review of instruction books.

(m) Assure timely selections of necessary instructor and maintenance personnel to meet Mike Monroney Aeronautical Center training and staffing requirements.

(3) Regions. Each region has appointed a regional project manager (see section 51). The regional project manager will ensure that facilities and engineering work is complete prior to the delivery of equipment. He will monitor the installation of the equipment and coordinate requests for contractual or technical support with APM-220 and the National Automation



Engineering Field Support Sector, APM-160. The project manager at each region will arrange for the appointment of a technical onsite representative (TOR) at each facility. The regions will fulfill the following responsibilities:

(a) Responsible for site preparation and monitoring equipment installation in accordance with schedules provided in appendix 1, figures 1 and 2 and table 7-2. Coordinate with APM and AAT on any changes to these schedules.

(b) Assign a Regional Integration Group (RIG) to provide for coordination, direction and guidance necessary for effective and timely implementation of the project. The RIG shall be chaired by the regional project manager and will be comprised of regionally selected Air Traffic and Airways Facilities personnel knowledgeable in implementation of automation programs. They are to be responsive to the guidance and direction of the region for monitoring the efforts at each site within the region. The RIG is to monitor and provide assistance and guidance in all phases of the terminal automation implementation for all regional sites.

(c) Designate, a technical onsite representative (TOR) to serve at each terminal facility. The TOR provides the regional coordination, direction, and guidance necessary for effective and timely accomplishment of site preparation functions during the terminal automation implementation at the site to which he is assigned. This includes onsite decision making and day-to-day problem solving. The TOR is to be the principal onsite regional representative and reports problems, progress, and other matters to APM 220 thru appropriate regional representatives. Established channels of communications between regions and APM-220 are to be used in carrying out the terminal automation program. The TOR is also to serve as a member of the Regional Integration Group (RIG) and Terminal Integration Group (TIG).

(d) Provide membership to the Terminal Integration Group (TIG) at each site. The TIG is to be comprised of designated onsite regional AT and AF personnel experienced in the implementation of electronic and/or automation systems. The TIG shall be designated no later than 90 days prior to shipment of the ARTS IIA to the respective site. They shall be responsive to the guidance and direction of the TOR. The TOR is to be guided by approved test documentation, the site installation planning report and project implementation plan. Personnel assigned to the TIG are to be engaged in test activities subsequent to IOC.

(e) Provide input to AAC and APM-220 as they relate to regional logistics requirements.

(f) Participate in the development of System Shakedown Test Plan.

(g) Conduct system shakedown and operations changeover testing in accordance with the requirements of the test plans for these functions.

(h) Develop the required environmental and AS BUILT records.

(i) Obtain through the Defense Commercial Communications Office (DECCO), as appropriate, all TELCO services required for the timely acquisition of communications required for ARTS IIA.

(j) Assure that appropriate FAA/Military local onsite agreements are reached.

(k) Generate the Operations Changeover Test Plan.

(l) Conduct the final Joint Acceptance Inspection (JAI) and the formal ARTS IIA certification exercise (commissioning) for designated terminal facilities.

(m) Generation of site specific adaptation data for the creation of ARTS IIA system load tapes.

(n) Establish financial and item management control, and accountability for all agency property received in the region.

(o) Provide proper administrative channels of communication to assure APM-220 full cognizance of project status at all times.

(p) Adapt NAS interfacility software for TPX-42 sites.

(q) Obtain interfacility modems through normal channels

51. PROJECT CONTACTS. Appendix 1, table 5 provides a listing of regional project managers, ART IIA project leads and other personnel who are providing those functions required for the implementation of the ARTS IIA systems or kits.

52. PROJECT COORDINATION. The following project groups will assist the TO in fulfilling assigned responsibilities.

a. ARTS IIA Program Planning Group. Ad hoc ARTS IIA Program Planning Group(s) are to be formed as required to develop conclusions and recommendations for changes in program implementation planning for consideration by accountable officials.

(1) Membership. Offices and services listed below have a major interest in most facets of the subjects to be dealt with, and shall designate member(s) to the Planning Group, depending upon the subject matter and their interest.

- (a) Program Engineering and Maintenance Service (APM); Chairman.
- (b) Air Traffic Plans and Requirements (ATR).
- (c) Air Traffic Operations (ATO).
- (d) Acquisition and Materiel (ALG).
- (e) Office of Personnel and Technical Training (APT 300).
- (f) SEIC.

(2) Duties of Members. Responsibilities of designated members are as follows:

- (a) Act as a focal point within their respective organizations for ARTS IIA program planning.
- (b) Provide liaison between the planning group and their respective organizations.
- (c) Take necessary action within their respective organizations for review and implementation matters.
- (d) Keep their respective organizations informed of program activities.

b. Configuration Control Board. In accordance with 1800.8E, National Airspace System Configuration Management, dated July 11, 1985, the Configuration Control Board (CCB) is the official agency-authorized vehicle to approve or disapprove baselines and changes to the baselines. There is a central NAS CCB to establish and control baselines and to administer configuration control. From this CCB, authority is delegated to lower-level CCB's to effectively administer proposed changes at the most appropriate level. All lower-level CCB's will be accountable to the NAS CCB which has been established through a charter defining its authority, responsibilities (including the the specific documents over which the CCB has control), and membership. Decisions and directions are documented in Configuration Control Decisions (CCD), which either approves, disapproves, defers, or refers the change request to another CCB. When contractual action is required, the CCD serves as a basis for preparation of procurement request which is submitted to the contracting officer. The CCD may also be distributed to other Government agencies and serves as an official notification of CCB action. Representatives on the CCB are to include the various agency services/offices that have responsibilities to acquire, support, and operate the system. Other representatives may be invited to attend as required.

(1) Membership

- (a) Air Traffic Plans and Requirements (ATR).
- (b) Air Traffic Operations (ATO).
- (b) Program Engineering and Maintenance Service (APM).
- (d) FAA Technical Center.
- (e) Systems Engineering Service (AES).
- (f) SEIC.
- (g) Acquisition and Materiel Services (ALG).

53. PROJECT RESPONSIBILITY MATRIX

<u>TASK/PLAN/ACTIVITY</u>	<u>PRIMARY OFFICE</u>	<u>SUPPORTING OFFICES</u>
Preliminary Installation Schedule	APM-220	Regions
Training Programs Schedules and Assignments	ATR-710 APM-110	ATR, APM-220, ATO AAT, Regions, AAC, APM-160
Interfacility Data Transfer Plan Update	ACT	ATR-200
Configuration Management (H/W and S/W)	AES-410	APM-160, ATR/ATO, Regions, APM-200
Software Maintenance (Operational)	ATR-260	APM-220, Regions, ATR-230
Software Maintenance (Diagnostic)	APM-160	APM-220, Regions
System Maintenance Procedures Handbook Update	APM-160	Contractor
Integration Test Plan and Procedures	ACT-120	APM-220 APM-160
System Shakedown Test Plan	APM-160	APM-220, ATO, ATR-560 Regions, ACT
System Shakedown Test Procedures	APM-160	APM-220, ATO, ATR ACT
Joint Acceptance and Inspection	Regions	APM-220, APM-160 ATR, ATO
Operations Changeover Test Plan	Regions	APM-160, ATR, ATO
Disposition of Excess Equipment Plan	APM-220	AAC, Regions, AAF
Logistic Support Planning	AAC	APM-220, Regions

54. PROJECT MANAGERIAL COMMUNICATIONS. Project Managerial Communication is provided monthly to APM 1 and ADL 1 through a Program Status Review Board (PSRB). This PSRB provides insight into cost, schedule, technical and logistics issues that may exist. Communication to the various branches of ATR, ATO, AAC, FAA Technical Center, the regions and other APM organizations occurs formally through Technical Interchange Meetings (TIM's) that are initiated during all stages of the program. Prior to implementation of the upgrade kits and the ARTS IIA systems, seminars will be held by APM 200 to provide updated schedules, technical and logistics information and to further explain site specific implementation issues.

55. IMPLEMENTATION STAFFING. Implementation staffing peculiar to the implementation phase of the contract involves the TOR working with his site personnel and the contractor. For the TPX-42 replacement sites Contractor implementation staffing requires a Site Installation Supervisor arriving at the site prior to the equipment delivery. When the equipment arrives a team of three contractor personnel will begin the installation and testing process. Since 3 systems will be installed per month and installation can take as long as 4 weeks, there are 3 TPX-42 teams. At the ARTS II upgrade sites a contractor will arrive with the kit to do the installation and testing. Five individuals will be utilized twice a month since ten sites will be upgraded in two 5 site increments. There is also a backup group of 3 to 4 personnel qualified for both kit and system installation in case of illness or schedule overloads.

56. PLANNING AND REPORTS.

- a. Configuration Control and Status Accounting Report - monthly. Provide the information needed to identify configuration identification and determine the status of change proposals, deviations, and waivers including implementation status.
- b. Project Progress Reports - monthly. Apprise the Government of the contractor's assessment of contractual effort as of the date of the report, work scheduled for the next period and special problem areas including proposed solution.
- c. Program Status Review Board - monthly. TO provides information cost, schedule and technical status of the project.
- d. Engineering Field Trip Reports - If exercised, field services shall be furnished by the contractor to provide engineering support in the event hardware or software problems are encountered in the onsite operation of the system. The contractor shall be required to furnish a report of each field trip within (7) seven calendar days after completion at each assigned site.

e. Site Installation Planning Report - The contractor provides sufficient technical information on the installation of the system to permit FAA field organizations and facilities to prepare the sites for system delivery and follow on installation and checkout activities.

57. APPLICABLE DOCUMENTS. See Appendix 2, List of Documents.

58.-59. RESERVED.





## CHAPTER 6 PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. Two contracts have been utilized in the development and production of ARTS IIA Upgrade and TPX-42 Replacement projects. The contracts are DTFA01-82-C-10008 ARTS II Enhancement and DTFA01-85-C-00040 ARTS II Upgrade. In late 1985, funds were allocated to the region which were not part of these contracts. Each region's TPX-42 site was allocated \$33,000 and each ARTS II site was allocated \$5,000 to be used for site preparation. The ARTS II Enhancement contract is valued at \$6.674M. The funds have been used for development of software (beacon tracking, MSAW, CA, DE, DR & A, and TSG/TTG) and the production of 3 prototype units used for testing and design evaluation. The DTFA01-82-C-10008 contract is a cost plus incentive fee contract which is near completion. The Upgrade contract is valued at \$35.7M of which \$10.1M is appropriated for kit upgrades and \$24.775M is appropriated for system replacement. The other \$825K has been appropriated to provide extra displays at sites. This is a fixed price contract and is within cost estimates. This contract also includes the development of documentation, spare parts, training, site adaptation data, maintenance services and engineering support services.

61.-69. RESERVED.



## CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. Deployment planning is a site specific necessity due to each sites requirements (e.g., interdependencies, upgrade kit vs TPX-42 replacement, building modifications, etc.). A generic Implementation Schedule (table 7-1) for those items prior to shipment is provided. This table provides an activity list for deployment planning. Not all items are applicable to every site, therefore this chart will serve only as a guidance document, and each site should modify the chart to meet their specific requirements.

71. SITE PREPARATION.

a. Kit. Government site preparation responsibilities at ARTS IIA kit installation sites are minimal. Each site must designate the locations and panel cutouts for the Aural Alarm Control Box(s) and Alarm Speaker Boxes (one associated for each display and one for the tower) templates for cutouts and hole drill patterns for these boxes are contained within the Site Installation Planning Report. Also the Aural Alarm Control Box will require a standard, 3-wire, 120 VAC at one ampere, power source within 15 feet of the box. At least 60 days before scheduled kit installation to the designated site, SDC will furnish survey forms. The site will indicate on the subject forms the lengths of the site dependent cables and, within 30 days, return the forms to SDC. The cables will then be cut to length by SDC and fitted with the proper connectors.

NOTE: If the Aural Alarm Control Box and Alarm Speaker Box cutouts are not completed at the time SDC installs the kit, these boxes will be placed in temporary locations near the final locations desired by the site, thus avoiding delay in site acceptance testing.

b. System. The preparation of TPX-42 replacement facilities for system installation fall into two broad categories: (1) Contractor site preparation responsibilities (2) FAA site preparation responsibilities.

(1) Contractor Responsibilities. At least sixty days prior to system installation the contractor will conduct a site survey. The intent of the survey is to identify site unique installation requirements prior to system installation. During the survey a site survey list will be completed by the Contractor with FAA assistance. Information to be gathered on the checklist include, but is not limited to:

(a) Proposed location of equipment in both the control area and the equipment room. Floor plan layouts of both rooms will be provided by the FAA.

(b) Proposed cable routing and estimated length of cable runs.

(c) Type of cable routing, i.e., overhead ladders, floor ducts, etc.

(d) Location, size, and type of power panel in relation to other equipment.

(e) Location of radar/beacon interface unit in relation to other equipment.

(f) Information on doorway, stairwell, elevator clearances, and loading.

(g) Any other general information mutually agreed to between the Government and the contractor.

(h) Site interdependencies.

In advance of equipment delivery the contractors site installation supervisor will arrive at the site to coordinate completion of facility preparation.

(2) FAA Responsibilities.

(a) Cable Support Facilities. All cable trays, ladders, ducts, raceways, conduits and associated hardware support facilities required for the following shall be procured and installed by the FAA at each ARTS IIA installation site prior to equipment arrival at the site.

1 Prime electrical power distribution conduit from power distribution panels to all ARTS IIA equipment positions in the FAA equipment rooms.

2 Prime electrical power distribution conduit from power distribution panels to ARTS IIA console positions.

TABLE 7-1. SITE IMPLEMENTATION SCHEDULE (PRIOR TO SHIPMENT)

	<u>Systems</u>	<u>Kits</u>
1. Notify APM-220, ATR-500 and ALG-310 of TOR, TIG, RIG	90 days prior to shipment	90 days prior to shipment
2. Receive documentation applicable to site prep and site installation	90 days prior to shipment	90 days prior to shipment
3. Complete Site Installation Plan	60 days prior to shipment	60 days prior to shipment
4. Receive site survey forms	N/A	60 days prior to shipment
5. Contractor accomplishes site survey	60 day prior to shipment	N/A
6. Submit FAA Form 4500-2	30 days prior shipment	30 days prior to shipment
7. Receive electrical connectors from contractor	30 days prior to shipment	N/A
8. Complete site preparation	20 days prior to shipment	20 days prior to shipment
9. Receive notification of delivery from contractor	15 days prior to shipment	15 days prior to shipment
10. Complete formalized training at FAA Academy	14 days prior to shipment	14 days prior to shipment

TABLE 7-2. INSTALLATION SCHEDULE (FOLLOWING SHIPMENT)ARTS IIA Kit

1.	Travel to site, schedule all activities with Government onsite rep.	1st Day
2.	Inventory and unpack equipment check site configuration, parameters, RADS, etc.	2nd Day
3.	FAA and SDC run full complement ARTS II certification test (Diagnostics), schedule downtime.	3rd Day
#4.	Install Kit - verify operation.	4th Day
#5.	Run SOS Test on site A205 software, patched to run on new hardware.	5th Day
#6.	Install new key caps, DDC boards, new software, verify mini SOS.	6th Day
#7.	Run acceptance test.	7th-9th Day
8.	Checkout spares.	10th Day
9.	Contractor Acceptance Inspection (CAI) and Initial Operational Capability (IOC).	10th Day
10.	Shakedown testing.	11th-13th Day
11.	ORD.	14th-15th Day
12.	Operations changeover/JAI, complete commissioning.	16th-22nd Day

#System will be available for operation in the test mode. The contractor will minimize any interference with on-going air traffic control functions.

TABLE 7-2. INSTALLATION SCHEDULE (FOLLOWING SHIPMENT) (CONT)

	<u>SYSTEM</u>	<u>TRACON</u>	<u>TRACAB</u>
1. Travel.		1st Day	1st Day
2. Unload Truck.		2nd Day	2nd Day
3. Inventory and set up equipment.		3rd-4th Day	3rd-4th Day
4. Sched. all activities with Govt. site rep start cabling.		5th Day	5th Day
5. Install all signal and power cables.		6th-7th Day	6th Day
6. Record levels.		8th Day	7th Day
7. Alignment of systems.		9th Day	8th Day
8. Alignment of RADS.		10th Day	---
9. Run signal cables to tower.		---	9th Day
10. Debug all equip.		11th Day	10th Day
11. Install and checkout ASR-4330 Teletype		12th Day	---
12. Run acceptance test.		13th-15th Day	11th-13th Day
13. Checkout spares.		16th Day	14th Day
14. Contractor Acceptance Inspection (CAI) and Initial Operational Capability.		16th Day	14th Day
15. Shakedown testing (FAA).		17th-47th Day	15th-45th Day
16. ORD.		48th-78th Day	46th-76th Day
17. Operations changeover/JAI complete commissioning.		79th-86th Day	77th-84th Day

3 All control and data signal cable support hardware for support of all cables from the ARTS IIA equipment room to the ARTS IIA display console positions (in the operations area)

4 All electrical cable support facilities required to support cables running between ARTS IIA cabinets and FAA interconnecting cabinets in the FAA equipment room (if any) shall be provided by the Government. The cable support facilities shall be brought to the approximate area of the new equipment.

(b) Primary Power Cables. The FAA shall provide, connect to FAA distribution panels, and bring to the immediate vicinity of the ARTS IIA equipment all necessary primary power cables. The contractor shall specify in the Site Installation and Planning Report the cable and circuit breaker sizes required. Connectors to hook up the ARTS IIA equipment to the power cables shall be furnished by the contractor at least thirty (30) calendar days before system delivery and shall be hooked up by the FAA.

(c) External ARTS IIA Signal Cables. The FAA shall provide all necessary external signals to a Demarcation Junction Box at a location in the area of the ARTS IIA equipment. Detailed measurements to establish contractor provided cable lengths will be determined during the site survey. All cables, including connectors shall be provided by the contractor. The Contractor shall be responsible for installing and checking out all ARTS IIA cables, connectors and terminations and ARTS IIA to external equipment cables, connectors, and terminations.

(d) Disposition of Excess Equipment. The FAA (APM-220) shall develop a plan for the disposition of excess equipment in accordance with Order 4800.2A, utilization and disposal of excess and surplus personal property.

(e) Grounding. The FAA will install the contractor provided grounding plate and 4/0 cable.

72. DELIVERY. The contractor is contractually responsible for all activities relating to packing, shipping, receiving, installing, integrating and testing of the ARTS IIA. All items specified by the contract are to be delivered to the sites by the contractor to permit testing and acceptance according to the schedules shown in table 7-1 and 7-2. This not only includes the applicable hardware components of the ARTS IIA system, but includes site adaption overlays, site spare parts, computer program tapes (including operational, maintenance diagnostics, and other computer support tapes), manuals, and other



documentation. A listing of completed ARTS IIA site configurations is provided in appendix 4. Inspection of the items shipped is accomplished by the contractor at each site, and he is responsible for all damage to equipment that may occur during shipment, uncrating, movement within the site, disposal of crating material and installation. Damaged equipment will be repaired or replaced, depending upon its condition, by the contractor. The regions should ensure that the technical officer has specific site shipping addresses and other instructions (e.g., marking instruction for shipping containers) that he can provide to the contractor for packing and shipping the ARTS IIA systems. The contractor shall be fully responsible for shipment (shipping arrangements and full-value liability) of all ARTS IIA equipment and material without damage or loss, from the contractor's plant to the installation site. The responsibility shall continue through the off-loading phase and placement of equipment at the designated installation positions. Systems and equipment shall be shipped to a specific room(s) within a respective site building, as specified by the site coordinator (TOR). It shall not be necessary to call upon FAA personnel to assist in this activity except to clear aisles and areas to allow for intrafacility transport of the delivered items to their destined locations. The contractor, at his election, may ship material, equipment, and documentation to the respective sites prior to, or after arrival of his installation crew. Whenever such shipments are made, the respective FAA site coordinator shall be notified fifteen (15) calendar days prior to date of shipment. Notification shall include: (1) planned date of shipment; (2) contract number; (3) description of equipment material or software and quantities; and (4) names of carrier. It shall be the responsibility of the Contractor to provide for storage of the equipment prior to the start of installation. Additional information on delivery can be found in the Burroughs Site Installation Planning Report.

73. INSTALLATION PLAN. The site planning function is the responsibility of the ARTS IIA contractor, APM-220, and the regions. The complete installation and acceptance tests of ARTS IIA equipment should take from two to four weeks depending upon the hardware configurations at each site. Typical installation schedules are presented in table 7-2. A Contractor Site Installation Planning Report will be provided to the regions for their use in the preparation of the facility for the installation and integration of the ARTS IIA systems. The

report includes the planning and technical information for facility preparation, e.g., equipment size and space requirements, power and cooling requirements, cable length restrictions, demarcation box details, equipment weights, interfacing data, etc. The regions/sites shall complete their own site installation plan, using information from the contractor's Planning Report, and other guidance documents. The plan should identify and emphasize the facility work that must be accomplished by the regions/sites for the installation of the ARTS IIA systems. The general requirements of the Contractor prepared Site Installation Planning Report are designated below:

a. The contractor shall integrate the ARTS IIA hardware with all other FAA equipment, and shall patch existing A2.05 level software for operation with ARTS IIA hardware.

b. Sites at which installation, integration, and support activities are being conducted will have an on-going air traffic control function. The Contractor shall minimize any interference with this function. All parts of the Installation Planning Report shall make note of scheduling, manpower (both Contractor and Government), and equipment requirements which may impact the ATC function.

c. The Contractor shall make adequate provisions in his personnel staffing and procedures to allow for a very flexible utilization of his on-site personnel to avoid conflicts with FAA activities at the site. Every effort will be made by the site personnel to permit as much of the installation work as possible to proceed on the prime shift, but no absolute assurance can be given that this will always be possible.

d. All wiring, materials and procedures used for and during installation and checkout shall be in conformance with all local codes and the National Electrical Safety Code. In the event of conflict between local codes and the National Electrical Safety code, the local code shall take preference. All installation materials must be of a type that is UL approved. All wiring material and procedures must also be in conformance with specifications referenced elsewhere in this document package. The Contractor shall install and bridge his video lines in such a manner that no discernible loading will result to existing equipment, and that failures occurring in Contractor's equipment will not affect FAA equipment.

e. The contractor will develop the site adaptation data and integrate this data with the contractor developed ARTS IIA software to produce a load tape for each site. The services provided will include, but not be limited to:

(1) Develop a methodology for collecting adaptation data for each site.

(2) Develop any necessary automated support tools for collecting formatting or verifying the site adaptation data.

(3) Develop an adaptation information kit to be supplied to each site containing detailed instructions for collecting the data, data collection forms, and site maps, etc.

(4) Develop and assist the FAA in administering nine three-day seminars, which will be given at the FAA Technical Center. The seminars shall be given to personnel responsible for providing site adaptation data. Schedules for seminars will be provided by APM 220 when available

f. Contractor responsibilities include, but are not limited to the following:

(1) Grounding. All components (plates, etc.) required for the ground system are to be supplied by the Contractor. The ground system shall be as presented in the Government approved Installation Planning Report. Where existing grounds, ground plates or references need to be modified, the Contractor shall also accomplish this.

(2) Equipment Installation. The contractor shall be responsible for all mechanical/physical installation aspects for the entire system. This includes bolting adjacent equipment room cabinets together and anchoring them to the floor, installing equipment support facilities, installing special test equipment in the designated areas, and other mechanical/physical requirements to provide a complete system.

(3) System Cabling. The contractor shall be responsible for providing and installing all ARTS IIA cabling, wiring, connectors and associated hardware, and for making all cable and wire terminations for the equipment room as well as ATC operations areas equipment. All cables shall be included in the parts of each associated ARTS IIA subsystem. If the Contractor so desires, an inspection may be made of each site within ten days before shipment of each system. A representative of the Government will be on-site at the time.

NOTE: Additional Information on site preparation can be found in the contractor's Site Installation Planning Report.

#### 74. FIRST SITE VERSUS FOLLOW-ON SITE REQUIREMENTS.

a. The first operational ARTS II upgrade and TPX-42 Replacement sites will be considered key sites. To ensure a thorough validation, additional personnel are provided to key sites during site implementation. The additional support required will be provided jointly, by the FAA Technical Center, FAA Headquarters, SEIC and the Contractor. Discrepancies noted during execution of plans and procedures will be corrected and follow-on sites will be promptly notified of the actions to be taken. The purpose of key sites is to validate the following prior to their use at subsequent sites.

- (1) Contractor Onsite System Test Plan and Procedures
- (2) System Shakedown Test Plan and Procedures
- (3) Operational Demonstration Test Plan and Procedures
- (4) Operations Changeover Plan and Procedures
- (5) Contractor Installation Plan

b. FAA Headquarters/SEIC. FAA Headquarters and SEIC will assist the first sites in the following activities:

- (1) Completion of the Contractor site survey checklist for equipment installation planning.
- (2) Preparation of the site parameter data required by the Contractor to develop the site adapted operational tape.
- (3) Validation of Contractor Installation Plan..
- (4) Validation of Contractor onsite test plan/procedures and test data sheets.
- (5) Validation of System Shakedown test plan/procedures.
- (6) Validation of test plan/procedures.
- (7) Validation of Operations Changeover plan/procedures.
- (8) Developing initial standards and tolerances through the recording and analysis of data obtained during operation.

c. Contractor.

(1) The contractor will be required to make any required changes to the ARTS IIA software (operational, diagnostic, off-line, utility). This shall include the development, integration, checkout and documentation required due to test and evaluation.

(2) All ARTS IIA software delivered to the first site shall be maintained in accordance with established configuration management procedures (Order 1800.8E). Any and all changes to the baselined ARTS IIA must be coordinated and controlled in accordance with these procedures.

75.-79. RESERVED.



## CHAPTER 8. VERIFICATION

80. GENERAL. Verification of technical contract requirements for the ARTS IIA will be accomplished by a series of test and evaluation activities, formal and informal, at the contractor's development and production sites, the FAA Technical Center, and on-site. Figure 8-1 depicts the verification approach and is applicable to both upgrade kits and TPX-42 Replacement site systems. The verification approach is based upon and in compliance with FAA Order 6020.2A Joint Acceptance Inspections for FAA Facilities. Specific test and evaluation activities associated with a system and kit differ and these differences will be addressed in subsequent paragraphs. The time axis is not drawn to scale. IOC occurs at the same time as CAI, ORD is a JAI activity milestone which can occur at any time. Factory testing will occur at the Contractor's facility and upon its completion the kits or Systems will be packaged, crated and shipped to sites for installation and on-site testing. The initial system and upgrade kit will be sent to the FAA Technical Center. At the completion of on-site testing the FAA will accept that system or kit and begin integration and shakedown testing. When it is verified that the equipment functions properly, meets Air Traffic operational requirements and is maintainable, systems and kits will be shipped to operational sites for installation, on-site testing, FAA acceptance, shakedown testing, JAI and commissioning.

81. FACTORY TESTING. Factory testing is the responsibility of the contractor and will be witnessed by FAA personnel. It is composed of those test and evaluation activities performed at the contractor's development/production site. There are four test phases associated with factory testing. They are Inspection, Subsystem Functional, Design Qualification and Factory System tests. Figure 8.2 and 8.3 depict those phases for systems and kits respectively. Factory testing initially involves incoming inspections which are accomplished and performed by the Contractor. Inspections will be informal nature to verify that all parts, components, printed circuit assemblies and subassemblies conform to all applicable standards. Subsystem Functional Testing is the final phase of factory testing for production articles. These are tests at the Subsystem level to verify the functional requirements of the Decoding Data Acquisition Subsystem (DDAS), the Data Processing Subsystem (DPS), the Data Entry and Display Subsystem (DEDS), and associated subassemblies therein, as per FAA-E-2570-B, Paragraph 4.3. They are formal in nature and will be accomplished at the Contractors manufacturing facility. The first three ARTS IIA systems to complete Subsystem Functional

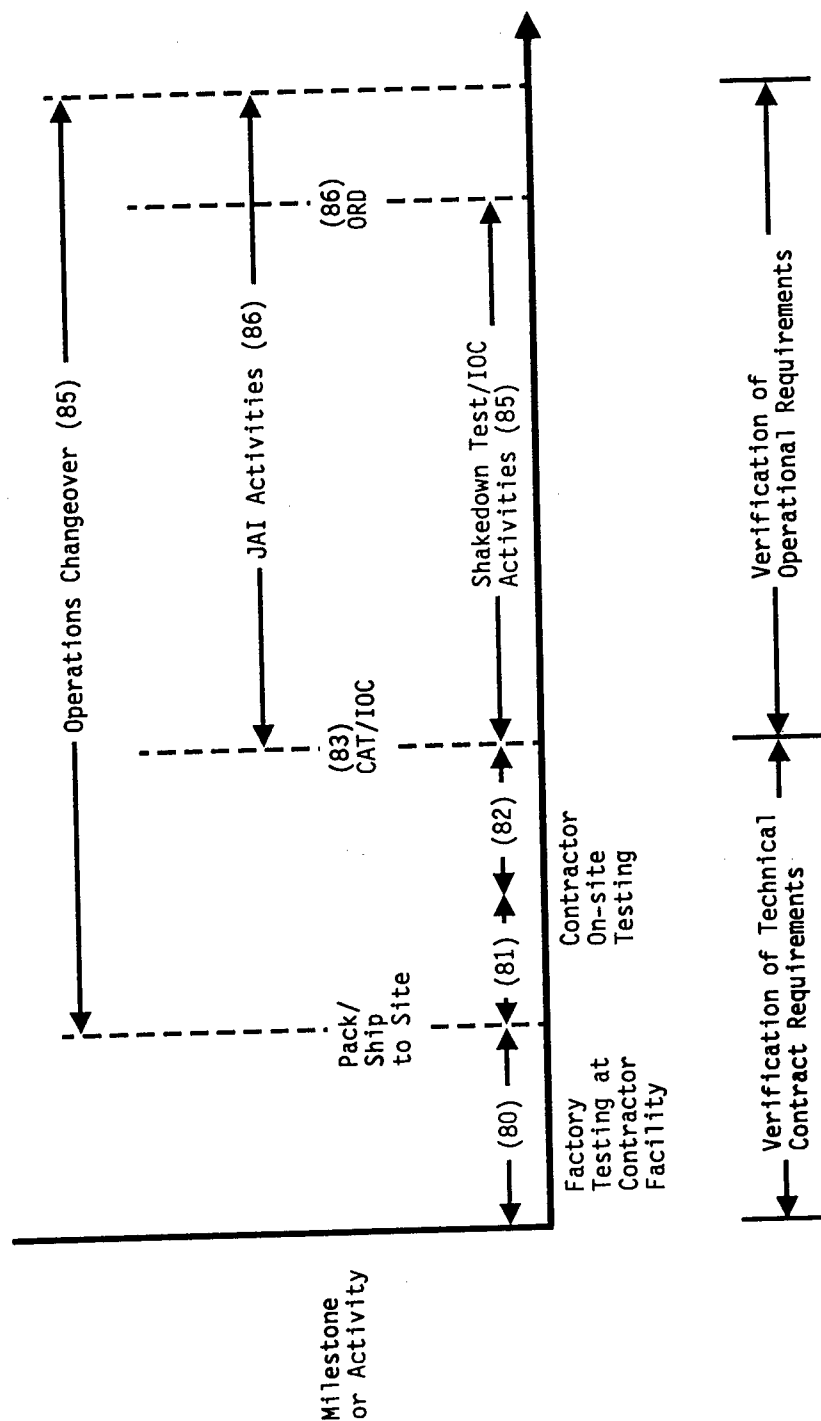


FIGURE 8-1 ARTS IIA VERIFICATION PROGRAM (KIT OR SYSTEM SITE)



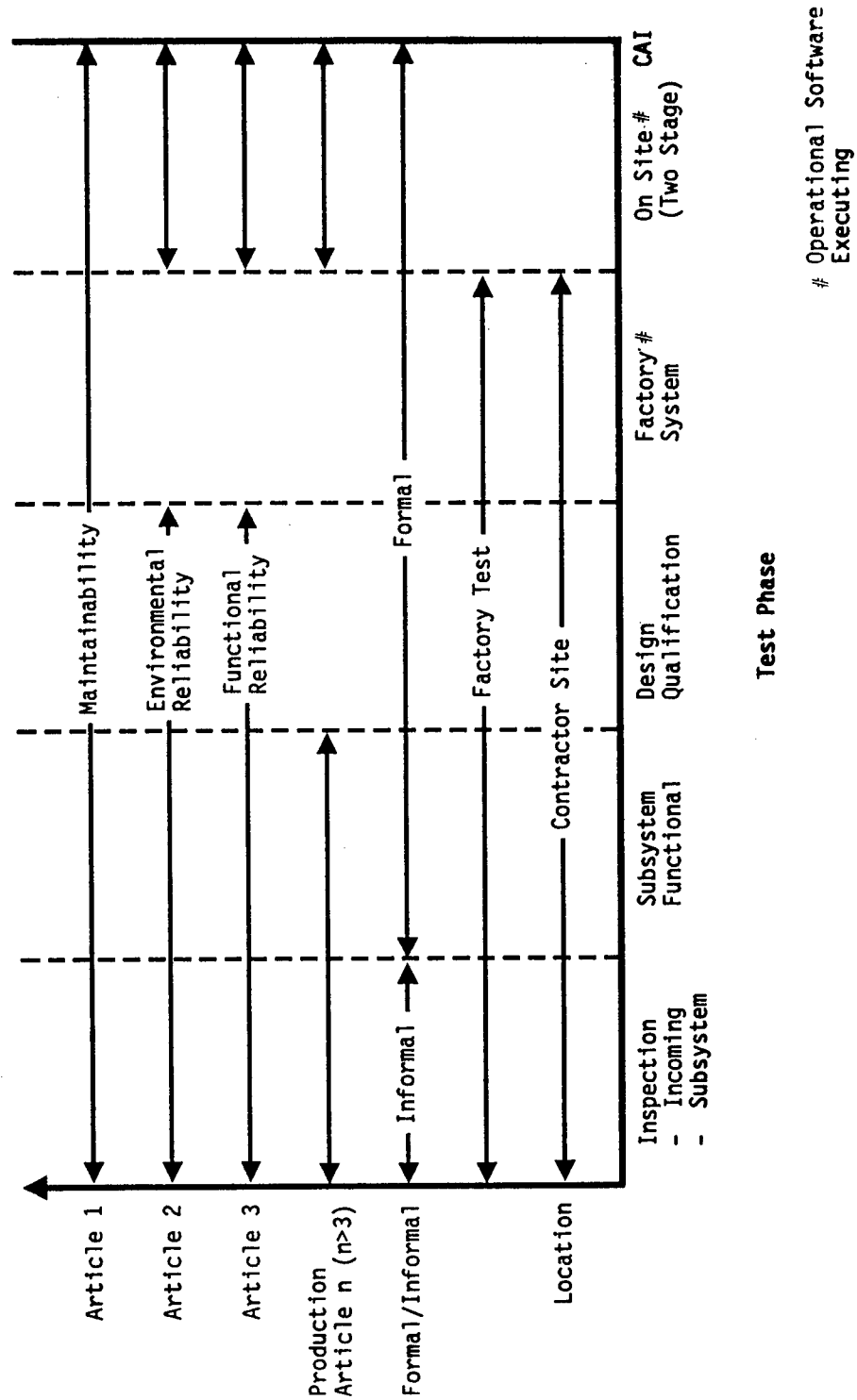


FIGURE 8-2 ARTS IIA ACCEPTANCE TESTING (TPX-42 REPLACEMENT SYSTEMS)

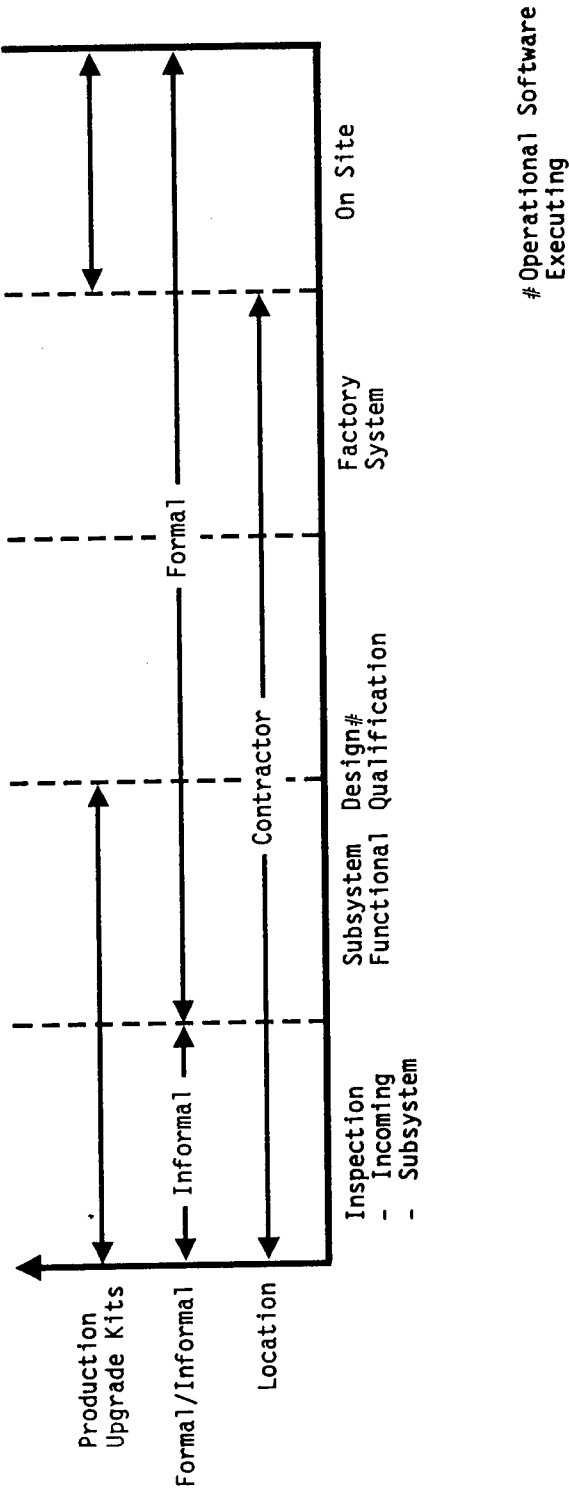


FIGURE 8-3 ARTS IIA ACCEPTANCE TESTING (KIT)

testing will undergo more extensive factory testing (Design Qualification, Factory System, and Environmental Testing). After these systems have completed these phases of testing, they will be refurbished and shipped to the field for installation and on-site testing. At this point, no more system-level testing will be done at the factory, except for a second Environmental test to be performed on a production system towards the middle of the production schedule. No system level testing will be performed on the ARTS IIA kits at the factory. After successfully completing Subsystem Functional testing, kits will be packed and shipped to sites for installation and on-site testing. The successful completion of factory testing is the criteria for shipment to the FAA Technical Center, Atlantic City, New Jersey, for first system and kit on-site testing.

82. CHECKOUT. This is the first stage of on-site testing and is performed by the contractor at the intra-subsystem level.

a. ARTS IIA Systems. These tests are used to verify hardware system integrity of the contractor-delivered equipment prior to interfacing with any site equipment. The tests will consist of processing internally generated targets, and checking the alignment of the displays for the correct presentations. The tests will include voltage and signal checks at all external output points, and checks for ground or short conditions at all external input points to insure that interface with external equipment is proper.

b. Upgrade Kit. Upgrade kit checkout will be accomplished by first running diagnostics on the current ARTS II system at the site to insure it is operational prior to new equipment installation. The new hardware will be installed and the ARTS IIA diagnostics will be run to verify the proper installation and operations of the DPS and associated peripherals. The test will consist of voltage, signal and ground checks at selected external output points, and running the complete repertoire of the ARTS IIA diagnostic programs. The ARTS IIA diagnostics are partitioned into a set of instructions which are designed to check a specific function or hardware unit or module. The successful completion of each diagnostic program will be verified by the completion message being output to the teletype.

83. CONTRACTOR INTEGRATION AND ACCEPTANCE TESTING.

a. Systems. Following the successful completion of system checkout, a test of the integrated equipment will be performed. To minimize interference with normal facility operations, tests will be conducted with the displays in

a test bed configuration with normal videos, triggers and azimuth information available. Verification will be accomplished primarily by observation of the data on the RADS and TTY output. All ARTS IIA internal interfaces will be checked by loading the Universal Data Set (UDS) site adapted system software tape. Targets will be provided by the TTG. The operational program exercise will be run and the following functions verified; Keyboard Input Processing, Display Output Processing, Beacon Tracking and Magnetic Tape Input, Minimum Safe Altitude Warning, Conflict Alert, Console Typewriter Output Processing, and Interfacility Message Processing.

(1) The operational software adapted for that site will then be loaded and the site adaptation software exercise will be run. All operational displays, keyboards and PEMs will be exercised and checked for proper adaptation. After completion, a 72-hour Confidence/Stability test will be run. This will consist of a 72-hour burn-in test, a system verification test, and a power-fail test.

(2) Upon completion of Contractor Integration and Acceptance Testing, the Contractor Acceptance Inspection (CAI) is conducted by the TOR. If the Contractor has successfully performed Integration and Acceptance Testing, the CAI milestone will designate acceptance of the equipment by the APM. Successful completion of Contractor Integration and Acceptance Testing also signifies Initial Operational Capability (IOC). IOC is that point during system implementation when hardware and software have been successfully merged, and have met defined contractual requirements. When required, an acceptable flight inspection shall be the final phase of IOC. IOC does not necessarily include verification of operational procedures nor full proficiency development.

b. Upgrade Kit. A test will be run using the Universal Data Set (UDS) site adapted system software tape. Targets will be provided by the TTG. Verification will be accomplished by observation of the data on the RADS and TTY output. The tests will exercise the following functions; Keyboard Input Processing, Display Output Processing, Beacon Tracking and Magnetic Tape Input, Minimum Safe Altitude Warning, Conflict Alert, Console Typewriter Output Processing, and Interfacility Message Processing.

(1) The ARTS II software which has been patched to run on the ARTS IIA hardware will then be loaded and exercised. The ARTS IIA operational software which has been adapted for that site will be loaded into the system, and software exercises will be run to check general site adaptation accuracy.

Specifically, using the site adapted software tape, system peripherals and software will be exercised to demonstrate selected site adaptation parameters/operations. These tests are designed to demonstrate that the proper value is stored or functions perform as expected and that they are interpreted and used correctly by the operational program.

(2) Finally, a 72-hour Confidence/Stability test will be run. This test will consist of a 72-hour burn-in-test, a system verification test, and a power fail test. Verification will be accomplished by lack of any new installed subsystem failures during the 72 hour period.

(3) Upon completion of Contractor Integration and Acceptance Testing, the Contractor Acceptance Inspection (CAI) is conducted by the TOR. If the contractor has successfully performed Integration and Acceptance Testing, the CAI milestone will designate acceptance of the equipment by the FAA. Successful completion of Contractor Integration and Acceptance Testing also signifies Initial Operational Capability (IOC). IOC is that point during system implementation when hardware and software have been successfully merged, and have met defined contractual requirements. When required, an acceptable flight inspection shall be the final phase of IOC. IOC does not necessarily include verification of operational procedures nor full proficiency development.

84. FAA INTEGRATION AND TESTING. This is a one time test at the FAA Technical Center prior to delivery at the first operational site. FAA Technical Center integration testing will verify the equipment performs in accordance with the requirements of the specification and the contract. These tests will be accomplished using live and simulated data in a test bed environment. The test bed includes a collection of subsystems that are functionally identical to existing equipment or equipment which in some future timeframe are going to be installed in the field. ACT-100 is the office of primary responsibility for FAA Integration Testing. Tasks will be performed by ACT-100 in accordance with the needs of APM-220. Testing for the initial upgrade kit and full system involves a check of ARTS IIA equipment with FAA Technical Center radar systems. Integration testing will involve checking system interfaces, running diagnostics, loading in Atlantic City Operational Software and running selected SOST procedures to verify requirements have been met.

85. SHAKEDOWN AND CHANGEOVER. Following CAI/IOC, the sites enter into a system shakedown period to reach the Operational Readiness Demonstration (ORD). The purpose of system shakedown is to familiarize AT and AF personnel with the integrated hardware and software subsystems. It is designed to establish operational and maintenance procedures with respect to the ARTS IIA, to satisfy the requirements for an operational readiness demonstration.

a. System Shakedown.

(1) System Shakedown Test Plan. APM-160 is responsible for developing a system shakedown test plan. APM-220 will ensure the development of a plan by responsible ATO, ATR, AAF, APM-160, regional, and FAA Technical Center participation. In addition, the regions are responsible for developing detailed procedures required at individual sites for the conduct of testing and for operations changeover.

(2) Prerequisites for Starting System Shakedown.

(a) The contractor is to have demonstrated that the system has complied with all technical and functional requirements of the contract, specification, and amendments, and that all deliverables are onsite and operable (CAI).

(b) ATC personnel are to have completed classroom training and proficiency development in the operation of the radar display. Selected Air Traffic Control specialists (three from each site) will have completed training for computer operations, system loading, system initialization, memory dumps, and other computer functions for the day-to-day operation of the system.

(c) At least one maintenance person is to have completed the required training and is to have achieved proficiency in system maintenance procedures.

(3) System Shakedown Activities. Tests will be accomplished in the operational environment and will be compatible with normal control of traffic with minimum interference to operations. Shakedown activities include:

(a) Operational and maintenance proficiency evaluation: site training, personnel readiness, training adequacy.

(b) Equipment performance: determination of reliability and maintainability, verification of system performance, failure mode analysis, failure detection and recovery, adequacy of all subsystems.

(c) Provisioning: defining available logistic support requirements.

(d) Confirmation of completeness of as-built drawings and instruction book page changes.

(e) Software functions: validation of site adaptation data, flight plan input, system parameters, CA, MSAW, and Aural Alarm.

(f) Operational suitability of display data: data blocks, tab lists, registration, CA, MSAW, and Aural Alarm.

(g) Adequacy and suitability of procedures and operations.

(h) Verification of operations changeover procedures.

(4) Operational Readiness Demonstration (ORD). The ORD is performed at the completion of shakedown activities. It is a formal demonstration that the facility is ready to support the realtime air traffic control tasks. It demonstrates the readiness of personnel, procedures, hardware, software, and support services to support these tasks, as applicable.

NOTE: Special emphasis will be placed on both equipment performance and the software functions. The adequate testing and possible modification of site adaptation data and system parameters require close coordination of site and test personnel.

d. Operations Changeover. Operation changeover is the phase of implementation wherein the ARTS IIA is phased into the ongoing Air Traffic control operations at a facility. The regions/sites are to develop operations changeover plans to include procedures, schedule phases, changeover

techniques, required coordination, and training requirements for phasing the automated system into ongoing operations. In addition, the regions/sites are responsible for implementing the operations changeover plans, reporting, and documenting all operations changeover associated activities, including the commissioning and operations certification for each automated terminal facility incorporated into the National Airspace System.

86. JOINT ACCEPTANCE INSPECTION (JAI). A JAI shall be conducted in accordance with Order 6020.2A, Joint Acceptance Inspection for FAA Facilities. The purpose of a JAI is to ensure that each ARTS IIA facility meets specified requirements for operation, maintenance, and has demonstrated that the facility is ready to be commissioned. The Joint Acceptance Board, when convened, may include representatives from: (1) APM-220, (2) regional offices, (3) Air Traffic Headquarters, (4) terminal sites, and (5) other representation as appropriate.

87.-89. RESERVED.



## CHAPTER 9. INTEGRATED LOGISTICS

90. GENERAL. The Logistics program for the ARTS IIA systems is based on the requirement to support all operational sites, the training center, FAA depot, and FAA Technical Center. The program conform to ARTS IIA Specification FAA-E-2570B, and ARTS IIA contracts DTFA01-82-C-10008 and DTFA01-85-C-00040.

a. To ensure that the most appropriate and effective logistics procedures are being instituted for the ARTS IIA, a joint FAA/SEIC-Contractor Integrated Logistics Support Management Team (ILSMT) has been established. The ILSMT will ensure that a well thought out, jointly planned (Government/SEIC) Logistics program is developed, that the contractor performs adequate logistics planning and initiates effective logistics discipline to develop a supportable, cost-controlled system. The ILSMT will meet formally on a periodic basis. Numerous sub-group gatherings will also occur as the need arises. The ILSMT chairman will be accountable to the Project Manager and will ensure that the following tasks, among others, are accomplished:

- (1) Negotiations of ILS support activities with the contractor.
- (2) Incremental review of support data development.
- (3) Review and approval of all Logistics Support Analysis (LSA) tasks.
- (4) LSA data review and analysis.
- (5) Evaluation of logistics proposals.
- (6) Integration of ARTS IIA logistics efforts with the NAS program.
- (7) Provision of timely logistics support guidance to the contractor.
- (8) Identification of LSA candidate items for MIL-STD-1388-2A action.
- (9) Supervision of Logistics Support Analysis Record (LSAR) activities.
- (10) Initiation and maintenance of effective Supply Support procedures.
- (11) The initiation and execution of an effective provisioning program.

(12) An effective training program is employed.

(13) An effective maintenance program is developed and actively pursued.

b. Implementation of the ARTS IIA system requires property management and accountability for all assets acquired in the program. Logistics support, including provisioning of spare parts and supply support of parts, supplies and working equipment, both initially and on a continuing basis, must be provided. Policy guidance and responsibilities for logistics operations are provided in the following:

- |                     |  |
|---------------------|--|
| (1) Order 1800.30   | Development of Logistic Support for FAA Facilities and Equipment, dated July 12, 1972  |
| (2) Order 1800.8E   | National Airspace System Configuration Management  |
| (3) Order 3000.6B   | Training   |
| (4) Order 4560.1A   | Initial Provisioning for Support of Facilities   |
| (5) Order 3000.10A  | Airway Facilities Maintenance Technical Training Program   |
| (6) Order 4620.1    | Scheduled Overhaul of Ground Facilities Equipment, dated December 1, 1966  |
| (7) Order 6000.30   | Airway Facilities Service Policy Decisions for the Maintenance Program of the 1980's   |
| (8) Order 4620.3C   | Initial Support for New or Modified Equipment  |
| (9) Order 6000.27   | Maintenance Philosophy Steering Group Report Update  |
| (10) Order 4630.2   | Standard Allowances of Supplies and Working Equipment for National Airspace Facilities, dated September 26, 1969   |
| (11) FAA G-1210     | Provisioning Technical Documentation   |
| (12) Order 4650.17A | Guide for Non-FAA Activities Which Receive Supply Support and Service from the FAA Mike Monroney Aeronautical Center (FAA Depot), dated February 2, 1972 |

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|----------------------|--|
| (13) FAA-STD-021     | Configuration Management   |
| (14) Order 6200.4C   | Test Equipment Management  |
| (15) FAA-STD-028     | Contract Training Programs   |
| (16) Handbook 4250.9 | Field Inventory Management and Replacement,<br>dated June 22, 1966             |
| (17) FAA-G-1375b     | Spare Parts - Peculiar for electronics,<br>electrical and mechanical equipment |
| (18) Handbook 4650.2 | Facility Equipment Records, dated June 15,<br>1965                             |
| (19) MIL-STD-1369    | Integrated Logistic Support Program<br>Requirements                            |
| (20) Handbook 4660.1 | Real Property, dated February 1969   |
| (21) MIL-STD-1388-1A | Logistic Support Analysis (LSA)  |
| (22) Handbook 4650.7 | Management of Project Material, dated May 3,<br>1968                           |
| (23) MIL-STD-1388-2A | DOD Requirements for a Logistics Support<br>Analysis Record                    |
| (24) Handbook 4800.2 | Utilization and Disposal of Excess and<br>Surplus Property, dated May 8, 1968  |
| (25) NAS-MD-001      | NAS Subsystem Baselined Configuration and<br>Documentation Listing             |
| (26) NAS-MD-002      | NAS Configuration Documentation Listing  |
| (27) NAS-MD-003      | NAS Summary Listing  |
| (28) Order 1100.134A | Maintenance of NAS Automation Subsystems                                       |

91. MAINTENANCE CONCEPT.

a. Hardware. Prior to the provisioning conference, an update to the ARTS IIA maintenance concept will be performed. APM-160 has the responsibility for developing an updated maintenance concept and maintaining the ARTS IIA diagnostic and maintenance program. The updated maintenance concept will be based upon new operational considerations, equipment modifications or additions, reliability figures for the new design and firmware resident diagnostic routines. The updated concept will be based upon a decision reached after thorough analysis of FAA and contractor support requirements, leasing agreements, and variable phasing. The ARTS II System Maintenance Procedures Handbook will be updated by APM-160. The updated maintenance concept will provide the guidelines for discussion at the provisioning conference. The program is limited enough in scope to not require a full scale logistics guidance conference or the expenditure of major effort on logistics requirements, the provisioning conference will be expanded into a forum addressing outstanding program logistics concerns. All aspects of the ARTS IIA procurement program will follow the guidelines presented within the National Airspace Integrated Logistics Support (NAILS) program plan.

b. Software. The operational and operational support software maintenance concept will be updated by ATR-240. The primary responsibility for the software maintenance rest with ATR-240. A primary objective is for each site to develop an in-house maintenance capability at the earliest possible time if that capability does not already exist.

c. Contractor Supported (Option). If sufficient FAA personnel are not available, in accordance with the contract, and only if exercised by option, the Contractor shall provide the support and associated services connected with both hardware and software. If the option is exercised, it is anticipated it will be on a site-by-site basis for those requiring site support. The contractor support requirements will be developed by APM-220, in coordination with the regions, with sufficient time to provide the contractor at least 90 calendar days notification for each site requiring support

services. The FAA will specify to the contractor the number of personnel, hours of coverage to be provided, and the start-stop dates of the services. The FAA furnishes all replacement parts, test equipment, working space, and makes available the diagnostic software to the contractor. The Contractor's personnel will be required to work on shifts as assigned. All of the system support will be performed by the members of the shift crew which shall be made up of both the FAA and Contractor personnel, who shall maintain close liaison and coordinate all services actions with the assigned FAA resident maintenance personnel. All availability and maintainability data collected for each 24-hour mission time shall be turned over for review each day. Initially, a great dependence upon the Contractor's personnel is recognized for the corrective/preventive activity. However, as the fruits of the OJT efforts are recognized, the equipment/software support activity shall gradually shift from the contractor personnel to FAA personnel.

92. TRAINING. ARTS IIA and TPX-42 controllers and maintenance personnel will receive training in the operation and maintenance of the system prior to the site installation date. The Project Manager working with ATR-710 and APM-110 will ensure that all training activities are initiated early enough to allow personnel to be qualified before participation in site or system certification. A training plan was developed which ensured that all training requirements were identified, that effective courses were developed and that a schedule was established to ensure all training is completed on time. The Training Programs Division, Office of Personnel and Technical Training, APT-300, in coordination with the operating services, provides overall training guidance and monitors accomplishment of training programs.

NOTE: The FAA Academy has received mod kits for upgrading their system  
s to an ARTS IIA configuration. They have also received a third  
ARTS IIA system.

a. FAA Academy Conducted and Regional-Conducted Training.

(1) Air Traffic Branch.

(a) ARTS IIA Operational Equipment for ATC Specialists (Course No. 55007). This is an update of the current ARTS II Operational Equipment for ATC Specialists (Course No. 55010) and reflects changes created by the ARTS IIA. This course is intended to provide interactive instruction and equipment exercises to controllers at ARTS IIA facilities. Training at TPX-42 replacement sites will be conducted by a regional training team using the operational hardware. Course length will be about 16 hours.

(b) ARTS IIA Air Traffic Automation Specialists and Operational Software (Course No. 53021). This groundup course is designed to train Automation Specialists with no previous ARTS II software experience. This course will provide the specialist with a working knowledge of the operational system, the system monitor, scheduling, reconfiguration, error analysis, input/output processing, each operational subprogram, and the programming language. Course length is 12 weeks. TPX-42 site personnel will have priority for classes. Each class will have 12 students each.

(2) Airway Facilities Branch.

(a) ARTS IIA for Technicians (Course No. 42042). This resident course will cover system operating procedures; functional theory of operation; troubleshooting; preventive maintenance procedures; diagnostics; test and utility programs; operational program organization; inter- and intra-equipment system relationships; and software. Course length is 15 weeks. This course will fulfill the training requirements for TPX-42 site technicians who will have first priority for attendance. Prerequisites: 44415 (Microprocessors) and any one of the following, 44314, 44315, 44316, 40318, 40335, 40339 (ATCBI course).

b. Contractor-Conducted Training.

(1) Air Traffic Branch.

(a) Air Traffic Supervisor/Trainer Course (Course No. 59024). This train-the-trainer course is designed to update facility ATC Managers and Training Specialists on Regional Training Teams. It teaches equipment familiarization operation and instructional techniques. Course length is 1 week and will be conducted at the FAA Technical Center. Twelve classes with 10 students in each are planned.

(b) Air Traffic Automation ARTS IIA Specialist Operational Software Update (Course No. 59025). This is an update course for ARTS II-experienced Automation Specialists and will cover only the software changes resulting from the ARTS IIA development. This is a 4 week course. Classes will be conducted at the FAA Academy with 12 students in each.

(2) Airway Facilities Branch.

(a) Airway Facilities Technician ARTS IIA Update Course (Course No. 42041). This course is designed for ARTS II-experienced maintenance technicians. It will cover the maintenance changes generated by the ARTS IIA development. Content will cover new theoretical/functional concepts, system and subsystem interfaces, and diagnostics. Course length is 4 weeks and will be taught at the FAA Academy.

(b) ARTS IIA Operational Software for Airway Facilities Technicians (Course No. 42043). This course, which is similar to the Air Traffic Automation Specialist Update Course, is designed for selected Airway Facilities Technicians who are required to know the operational software. This course is 4 weeks long. No classes are presently planned.

93. SUPPORT TOOLS AND TEST EQUIPMENT. All support tools and test equipment necessary for the installation, test, and maintenance of the ARTS IIA system are to be identified by the contractor. A tool list, meeting the documentation requirements of FAA-G-1210d, paragraph S-14-1, and a test equipment list meeting FAA-G-1210d, paragraph S-13-1, are to be provided to APM-220 for review and approval. Test equipment must be selected and documented in accordance with Order 6200-4a, Test Equipment Management Handbook. Support tools and test equipment lists will be approved during the provisioning technical conference. The list of support tools and test equipment will be used by both government agencies and vendors, under guidance of the contracting officer, to procure the appropriate tools and test equipment required for each site.

94. SUPPLY SUPPORT. The provisioning requirements of spare parts are determined through contractor developed provisioning technical documentation submittals and requirement analyses followed by a provisioning conference directed and jointly executed by the program office and the FAA Depot. Planning and procurement actions have occurred which provide each ARTS IIA site with an adequate level of spare parts. An appropriate level of spares have been procured for depot level support. The site spares will be delivered for destination to the respective sites for those parts procured from the ARTS IIA system contractor. These will be inspected, tested in the system by the contractor, and accepted by the sites prior to acceptance of the ARTS IIA system at each site; the system will not be accepted until the spare parts are accepted and a level of spares is attained at the FAA Depot as specified within FAA-G-1375b. The FAA Depot will coordinate the regions and have management authority concerning the procurement of common or peculiar parts other than from the system contractor or other sources. The catalog of site spare requirements will also be provided to the sites by the FAA Depot. The requisitioning of follow-on site spares when stock levels reach the reorder point will be accomplished through the normal requisitioning procedures with the FAA Depot. Spare parts provisioning for the ARTS IIA is from three basic sources:

a. Upgrade Kit and TPX-42 replacement on site spares. The onsite spares are delivered concurrently with site equipment and are at the assembly and subassembly level. Provisioning technical documentation is supplied with this source. The provisioning documentation consists of the following:

- (1) Long lead item list.
- (2) Provisioning parts list.
- (3) Numerical parts list.

- (4) Drawings.
- (5) Item identification/item logistics data records.
- (6) Program data for Read Only Memories (ROMS) and Programmable Read Only Memories (PROMS).
- (7) Master pattern and plan view of parts layout.
- (8) Installation material list.
- (9) Soft consumable list.
- (10) Test equipment list.
- (11) Tool list.
- (12) Site spares list.

b. Parts Peculiar Spare Parts are listed in attachment 9 of contract DTFA-01-85-C-00040. These spare parts are deliverable to the FAA Depot in accordance with paragraphs 5.3 and 5.4 of FAA-G-1375b.

c. Follow-on support, in addition to items a and b, are identified through technical discussions at the ARTS IIA provisioning conference. Sixty days after the provisioning conference, the FAA Depot will determine stock requirements for sites and the Depot per Order 4620.3C, Initial Support for New or Modified Equipment Installation. This order assigns responsibility to the FAA Depot to establish Initial Site Support Allowance Charts (ISSAC) and maintain adequate stock to support new or modified equipment installations. Regions are to submit FAA Form 4500-2 to the FAA Depot, in accordance with paragraph 71, Handbook 4650.7. The FAA Depot will prepare FAA Form 4250-3 requisition and requisition suspense cards, and delivery of ISSAC items. The FAA Form 4650-12 for each facility should identify the number, and type of equipment to be supported. The forms should be forwarded to the FAA Depot no later than three months prior to the scheduled date of final acceptance of the ARTS IIA system at the site. The FAA Depot is to use procedures in paragraph 33, Handbook 4250.9 to furnish stock items and the associated requisitioning forms. ISSAC items must be received on-site before the scheduled date of the joint acceptance inspection. The requisitioning of follow-on site spares will be accomplished through normal requisition procedures with the FAA Depot. Storage space for spares will be provided at each site. The regions should ensure this space is made available.



95. DOCUMENTATION. ATR-240 is responsible for determining the appropriate software documentation distribution and APM-160 is responsible for determining the appropriate hardware documentation distribution each office associated with the implementation of the ARTS IIA. A list of contractor deliverable, and FAA created documentation is provided in table 9-1. This table includes document title, the recipient, and approximate timeframe of delivery.

96. EQUIPMENT REMOVAL. Disposition of equipment removed by the contractor during installation of the ARTS IIA (upgrade kit or TPX-42 replacement site) shall be in accordance with Order 4800.2A, Utilization and Disposal of Excess and Surplus Personal Property. Presently, TPX-42 equipment will be provided to the Navy.

97. CONFIGURATION MANAGEMENT. The configuration management procedures for the ARTS IIA hardware and software will follow the established FAA procedures identified in Order 1800.8E, National Airspace System Configuration Management; NAS-MD-001, NAS Subsystem Baseline Configuration and Documentation Listing; and NAS-MD-003, Summary Listing - NAS Change Proposals and Configuration Control Decisions. Configuration management is required during the life cycle of the system. The FAA contracting officer and his representatives (with the assistance and coordination of the FAA staff) exercise contract management and administration during system development and production to insure that the product meets FAA requirements. Any proposed changes to the product baseline must follow the configuration management procedures and policies identified in Order 1800.8E, for approval and status accounting. The following further defines the configuration management process.

a. Hardware Configuration Management. The hardware configuration falls within two categories during the life of the ARTS IIA contract with the contractor: 1) equipment in the factory, 2) equipment previously accepted by the FAA. APM-160 at the FAA Technical Center is responsible for site support associated hardware problems. Hardware discrepancy reports/program technical reports (HDRs/PTR) are prepared by the sites and submitted to AES-410/APM-160 in accordance with Order 1100.134A, Maintenance of National Airspace System Automation Subsystems.

(1) Factory Equipment. The Contractor will make any FAA approved changes to equipment in this category, and the contractor will provide page changes to the equipment or software instruction books. The contractor will also effect changes to correct design deficiencies if such should occur.

(2) Site Accepted Equipment. Any approved changes to production equipment will also be incorporated into equipment previously accepted by the FAA. This will be accomplished by the contractor or the regions on a case-by-case basis, in accordance with established configuration management procedures. The contractor will also effect changes to correct design deficiencies of onsite equipment if such should occur.

b. Software Configuration Management. Software refers to the operational, non-operational support, and maintenance diagnostic computer program delivery at the time product baseline is established, i.e., the system acceptance at the FAA Technical Center. Automation Software Division (ATR-200) will assume configuration management responsibilities for operational, diagnostic and support software at the time the product baseline is established.

(1) Software Maintenance. Two branches at the FAA Technical Center (ATR-240 and APM-160) support maintenance of software programs. Automation Systems ATR-240 at the FAA Technical Center will be responsible for the operational software (including site adaptation software and associated documentation). APM-160 at the FAA Technical Center will be responsible for maintenance of diagnostic software and the associated documentation.

(2) Program Trouble Reporting. The PTR will be completed by the ARTS IIA sites and forwarded to ATR-240 for operational software and APM-160 for diagnostic software, in compliance with paragraph 12 of FAA Order 1100.134A. New system tapes resulting from PTRs, or other updating, will be provided to the sites where ARTS IIA systems are installed, the FAA Academy, and the contractor by ATR-240 and APM-160. After acceptance of the system, operational/support software changes developed by the contractor to correct design deficiencies shall be tested and distributed by ATR-240.

c. Reviews and Audits. Configuration reviews and audits are conducted to verify that the level of performance achieved for each subsystem at that point in the life-cycle is as specified. Reviews are the mechanisms by which the different levels of specification documentation are examined and approved before proceeding with the development. Configuration audits must verify documentation against previous baselines and added changes as well as compare the configuration against the approved configuration identification document.

98.-99. RESERVED.

TABLE 9-1. IMPLEMENTATION DOCUMENTATION

<u>DOCUMENT DESCRIPTION</u>	<u>RECIPIENT</u>	<u>TIME REQUIRED</u>
1. Developed by Contractor:		
a. Installation Planning Report	Regions Sites ACT-120 APM-160 SEIC ATR-510 Academy	July 1986
b. Test Plan	Regions Sites ACT-120 APM-160 ATR-560 ATR-510 SEIC MITRE	July 1986
c. Test Procedures	APM-220	September 1986
Subsystem Functional	SEIC	
Design Qualifications	MITRE	
Type	Regions	
Reliability/Maintainability	Sites	
Factory System	APM-220	
Onsite	APM-160 ATR-560 ATR-510 SEIC MITRE	
d. Training Materials	Regions	December 1986
Operator Manual	Sites APM-110 ATR-110 AAC-932 AAC-944 SEIC MITRE	Continue thru Training Program
e. Provisioning Technical	Regions	September 1986
Documentation	Sites APM-220 APM-160 AAC SEIC	

TABLE 9-1. IMPLEMENTATION DOCUMENTATION (CONT)

<u>DOCUMENT DESCRIPTION</u>	<u>RECIPIENT</u>	<u>TIME REQUIRED</u>
f. Site Adaptation Kit	Regions Sites ACT-120 APM-160 ATR-560 ATR-510 SEIC MITRE	April 1987
g. Program Reference Manual Operational Program CPFS Part 1 / Part 2 Coding Spec	Regions Sites ACT-120 APM-160 ATR-560 ATR-510 AAC-932 SEIC MITRE	October 1987
h. Maintenance Instruction Books	Regions Sites APM-220 APM-160	May 1986
i. Management Reports, Index of Drawings, and Technical Memorandum	AAC-944 Regions Sites APM-220 APM-160 AAC	Monthly
j. Non-Operational Program Documentation	Sites APM-220 APM-160 ATR-560 ATR-510	As Required
k. Site Survey Kit	Sites Regions APM-220	April 1987
2. Developed by FAA:		
a. Site Installation Plan Data for Use by the Contractor	Region APM-220 Unisys	60 days prior to shipment of equipment to site

TABLE 9-1. IMPLEMENTATION DOCUMENTATION (CONT)

<u>DOCUMENT DESCRIPTION</u>	<u>RECIPIENT</u>	<u>TIME REQUIRED</u>
b. ACT-120 Integration Test Plan (FAA Technical Center Only)	APM-220 ATR-560 ATR-510 APM-160 SEIC	60 days prior to shipment of equipment to Tech Center
c. ACT-120 Integration Test Procedures (FAA Technical Center Only)	APM-220 ATR-560 ATR-510 APM-160 SEIC	30 days prior to shipment of equipment to Tech Center
d. Shakedown Test Plan (FAA Technical Center)	ACT-120 APM-220 ATR-560 SEIC ATR-510	60 days prior to shipment of equipment to Tech Center
e. Shakedown Test Procedures (FAA Technical Center)	ACT-120 APM-220 ATR-560 ATR-510 SEIC	30 days prior to shipment of equipment to Tech Center
f. Shakedown Test Plan and Procedures (Production Sites)	Sites ATR-510 APM-160 ATR-560 SEIC	30 days prior to shipment of equipment to the site
g. Operational Readiness Demonstration Test Plan and Procedures	Sites APM-160 ATR-560 SEIC	30 days prior to shipment of equipment to the site
h. Equipment Removal Plan	Sites APM-220 AAC	30 days prior to shipment of equipment to the site
i. Changeover Plans/Procedures	Regions Sites	30 days prior to shipment of equipment to the site



APPENDIX 1PERTINENT ARTS IIA SCHEDULES

This appendix contains scheduling information pertinent to the implementation of the ARTS IIA program and will be updated without requiring changes to other parts of the plan. The tables and figures addressed within this plan include:

Table 1	Major Milestones completed
Table 2	Major Milestones to be completed
Table 3	Site Interdependency Matrix ARTS IIA/MALA/Mode S/ASR-9 INST Order
Table 4	Site Interdependency Matrix ARTS IIA/MALA/Mode S/ASR-9 Alpha Order
Table 5	Project Contacts
Figure 1	Summary Milestone Schedule ARTS II Enhancements
Figure 2	Summary Milestone Schedule TPX-42 Replacement

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TABLE 1. MAJOR MILESTONES COMPLETED

<u>ACTIVITY DESCRIPTION</u>	<u>ACTUAL FINISH</u>
COST BENEFITS ANALYSIS COMPLETED	11-NOV-1982
SYSTEMS REQUIREMENTS REVIEW (SRR) COMPLETED	3-DEC-1982
PROCUREMENT REQUEST RELEASED FOR EQUIPMENT	4-JAN-1984
CONTRACT AWARD	18-JUL-1985
CONDUCT PDR	24-OCT-1985
DELIVER ADAPTATION INFORMATION KIT	18-APR-1986
DELIVER FINAL RELIABILITY/MAINTAINABILITY REPORT	21-APR-1986
PREP CPFS PART(2) & DESIGN SPEC DRAFT	21-APR-1986
DELIVER FINAL INSTALLATION PLANNING REPORT	24-APR-1986
FACTORY ACCEPTANCE TEST PLAN APPROVED	16-MAY-1986
SITE ACCEPTANCE TEST PLANS APPROVED	16-MAY-1986
CONDUCT CDR	29-MAY-1986
PROJECT IMPLEMENTATION PLAN APPROVED (DRAFT)	15-JUL-1986
FACTORY ACCEPTANCE TEST PROCEDURES APPROVED	30-SEP-1986
FIRST ARTICLE PRODUCTION (TPX-42)	29-OCT-1986
FIRST ARTICLE PRODUCTION (ARTS IIA)	5-NOV-1986
SYSTEM DELIVERED TO FAA ACADEMY (BUILD 3)	28-NOV-1986
SYSTEM DELIVERED TO FAATC (ARTS IIA)	12-DEC-1986
SYSTEM DELIVERED TO FAATC (TPX-42)	31-DEC-1986
FACTORY ACCEPTANCE TEST COMPLETED	27-MAR-1987



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TABLE 2. MAJOR MILESTONES TO BE COMPLETED

<u>ACTIVITY DESCRIPTION</u>	<u>MILESTONE DATE</u>
ADAPTATION SEMINAR	JUL-1987
APM-160 SHAKEDOWN TEST COMPLETED (TPX-42) (ARTS IIA)	SEP-1987
ACT-100 INTEGRATION TEST COMPLETED (TPX-42) (ARTS IIA)	OCT-1987
ATC TESTING AND ACCEPTANCE COMPLETED (TPX-42) (ARTS IIA)	NOV-1987
SITE PREPARATION COMPLETED FOR FIRST SITE (TPX-42)	NOV-1987
SYSTEM DELIVERED TO FIRST OPERATIONAL SITE (ARTS IIA)	NOV-1987
SYSTEM DELIVERED TO FIRST OPERATIONAL SITE (TPX-42)	FEB-1987
FIRST OPERATIONAL READINESS DEMONSTRATION (TPX-42)	APR-1988
FIRST OPERATIONAL READINESS DEMONSTRATION (ORD) (ARTS IIA)	FEB-1988
SYSTEM DELIVERED TO LAST OPERATIONAL SITE (ARTS IIA)	OCT-1988
LAST ORD COMPLETED (ARTS IIA)	DEC-1988
SYSTEM DELIVERED TO LAST OPERATIONAL SITE (TPX-42)	DEC-1988
LAST ORD COMPLETED (TPX-42)	JAN-1989

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TABLE 3. SITE INTERDEPENDENCY MATRIX ARTS IIA/MALA/MODE S/ASR-9  
(IN ORDER OF INSTALLATION)

SITE	STATE	LOCATION ID	REGION	TERMINAL SYSTEM	DATE RECEIVE NEW ASR-9	DATE RECEIVE MODE-S	DATE RECEIVE ARTS IIA	DTE RECEIVE MODE-S/A SR-9 BOARD
FAATC REL M. LAKE	NJ	N/A	ACT		/ /	/ /	11/26/86	02/16/88
OKC ACADEMY SYS-2	OK	N/A	AAC		/ /	/ /	11/26/86	02/16/88
DOWN. FAA DEPO HOT	OK	N/A	AAC		/ /	03/04/89	11/26/86	02/16/88
OKC ACADEMY SYS-1	OK	N/A	AAC		11/06/87	02/04/88	11/30/88	02/16/88
FAATC (POUGH)	NJ	N/A	ACT		11/15/87	07/04/87	12/12/86	02/16/88
ACADEMY DEPO RELOC	OK	ACC			/ /	/ /	12/31/86	02/16/88
ATLANTIC CITY	NJ	ACY	AEA	ARTS2	05/20/90	/ /	11/30/87	12/01/88
CHATTANOOGA	TN	CHA	ASO	ARTS2	/ /	06/30/93	02/15/88	02/15/88
LUBBOCK-REESE	TX	LBB	ASW	ARTS2	03/10/90	10/31/93	02/15/88	02/15/88
MIDLAND	TX	MAF	ASW	TPX42	/ /	01/04/91	02/15/88	02/15/88
PENSACOLA	FL	PNS	ASO	ARTS2	/ /	05/04/88	02/15/88	02/15/88
RIO GRANDE	TX	HRL	ASW		01/10/88	03/31/93	02/15/88	02/15/88
DENVER FAATC R&D	NJ	N/A	ACT		/ /	/ /	02/16/88	02/16/88
CORPUS CHRISTI	TX	CRP	ASW	ARTS2	/ /	05/04/89	02/28/88	02/28/88
DAYTONA BEACH	FL	DAB	ASO	ARTS2	05/10/90	/ /	02/28/88	02/28/88
LITTLE ROCK	AR	LIT	ASW	ARTS2	/ /	08/04/89	02/28/88	02/28/88
RENO	NV	RNO	AWP	ARTS2	/ /	07/31/93	02/28/88	02/28/88
WICHITA	KS	ICT	ACE	ARTS2	02/28/88	06/04/89	02/28/88	02/28/88
AUSTIN	TX	AUS	ASW	ARTS2	06/20/88	05/04/89	03/14/88	03/14/88
HARRISBURG	PA	HAR	AEA	ARTS2	01/20/90	10/04/90	03/14/88	03/14/88
LAFAYETTE	LA	LFT	ASW	ARTS2	/ /	08/31/93	03/14/88	03/14/88
RICHMOND	VA	RIC	AEA	ARTS2	10/30/88	04/30/93	03/14/88	03/14/88
LANSING	MI	LAN	AGL	TPX42	12/20/88	/ /	03/15/88	03/15/88
GREENSBORO	NC	GSO	ASO	ARTS2	12/20/89	/ /	03/31/88	03/31/88
KNOXVILLE	TN	TYS	ASO	ARTS2	12/30/89	06/30/93	03/31/88	03/31/88
CHARLESTON	SC	CHS	ASO	ARTS2	03/30/88	09/04/89	04/15/88	04/15/88
FT WAYNE	IN	FWA	AGL	ARTS2	04/20/90	09/30/93	04/15/88	04/15/88
TOLEDO	OH	TOL	AGL	ARTS2	06/10/88	/ /	04/15/88	04/15/88
ROANOKE	VA	ROA	AEA	ARTS2	/ /	04/04/89	04/30/88	04/30/88
SPOKANE	WA	GEG	ANM	ARTS2	/ /	03/04/91	04/30/88	04/30/88
BILLINGS	MT	BIL	ANM	TPX42	/ /	02/04/91	05/15/88	05/15/88
FRESNO	CA	FAT	AWP	ARTS2	/ /	03/04/91	05/15/88	05/15/88
FT SMITH	AR	FSM	ASW	TPX42	/ /	05/04/91	05/15/88	05/15/88
GREENBAY	WI	GRB	AGL	TPX42	/ /	02/04/91	05/15/88	05/15/88
CHAMPAIGN	IL	CMJ	AGL	ARTS2	/ /	08/31/93	05/31/88	05/31/88
EVANSVILLE	IN	EVV	AGL	ARTS2	/ /	02/04/91	05/31/88	05/31/88
MACON-WAR ROB	GA	WRB	ASO	ARTS2	/ /	03/04/91	05/31/88	05/31/88
ERIE	PA	ERI	AEA	TPX42	/ /	11/30/93	06/15/88	06/15/88
HUNTSVILLE	AL	HSV	ASO	ARTS2	06/06/87	/ /	06/15/88	06/15/88
LAKE CHARLES	LA	LCH	ASW	ARTS2	/ /	04/04/91	06/15/88	06/15/88
MONTGOMERY-MAXWELL	AL	MXF	AWO	ARTS2	02/10/90	07/31/93	06/15/88	06/15/88
PEORIA	IL	PIA	AGL	TPX42	/ /	09/30/93	06/15/88	06/15/88
PORTLAND	ME	PWM	ANE	ARTS2	/ /	03/31/93	06/15/88	06/15/88
JACKSON	MS	JAN	ASO	ARTS2	/ /	04/04/89	06/29/88	06/29/88

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TABLE 3 (cont)

SITE	STATE	LOCATION ID	REGION	TERMINAL SYSTEM	DATE RECEIVE NEW ASR-9	DATE RECEIVE MODE-S	DATE RECEIVE ARTS IIA	DTE RECEIVE MODE-S/A SR-9 BOARD
WILKES-BARRE	PA	AVP	AEA	ARTS2	/ /	04/30/93	06/29/88	06/29/88
ABILENE-DYESS	TX	DYS	ASW	TPX42	/ /	04/04/91	07/15/88	07/15/88
AUGUSTA	GA	AGS	ASO	TPX42	/ /	06/30/93	07/15/88	07/15/88
CEDAR RAPIDS	IA	CID	ACE	TPX42	06/10/90	01/04/91	07/15/88	07/15/88
MONROE	LA	MLU	ASW	ARTS2	/ /	08/31/93	07/15/88	07/15/88
TALLAHASSEE	FL	TLH	ASO	ARTS2	/ /	06/04/91	07/15/88	07/15/88
BANGOR	ME	BGR	ANE	ARTS2	/ /	04/04/91	07/31/88	07/31/88
DULUTH	MN	DLH	AGL	ARTS2	/ /	05/04/91	07/31/88	07/31/88
LONGVIEW	TX	GGG	ASW	ARTS2	/ /	08/31/93	07/31/88	07/31/88
MERIDIAN	MS	NMM	ASO	ARTS2	/ /	07/31/93	07/31/88	07/31/88
ANCHORAGE	AK	ANC	AAL	ARTS2	/ /	12/31/93	08/15/88	08/15/88
ASHEVILLE	NC	AVL	ASO	TPX42	05/30/90	/ /	08/15/88	08/15/88
EUGENE	OR	EUG	ANM	ARTS2	/ /	10/31/93	08/15/88	08/15/88
HUNTINGTON	WV	HTW	AEA	TPX42	/ /	05/31/93	08/15/88	08/15/88
BRISTOL/TRI-CITIES	TN	TRI	ASO	ARTS2	/ /	05/04/89	08/29/88	08/29/88
CLARKSBURG	WV	CKB	AEA	ARTS2	/ /	05/31/93	08/29/88	08/29/88
SANTA BARBARA	CA	SBA	AWP	ARTS2	/ /	04/04/91	08/29/88	08/29/88
SPRINGFIELD	MO	SGF	ACE	ARTS2	/ /	03/04/91	08/29/88	08/29/88
BAKERSFIELD	CA	BFL	AWP	ARTS2	/ /	10/31/93	09/15/88	09/15/88
ROCHESTER	MN	RST	AGL	TPX42	/ /	09/30/93	09/15/88	09/15/88
WILMINGTON	NC	ILM	ASO	ARTS2	/ /	05/04/91	09/15/88	09/15/88
BISMARCK	ND	BIS	AGL	ARTS2	/ /	06/04/89	09/29/88	09/29/88
CHARLESTON	WV	CHW	AEA	ARTS2	/ /	05/31/93	09/29/88	09/29/88
GREAT FALLS	MT	GTF	ANM	ARTS2	/ /	05/04/91	09/29/88	09/29/88
GRAND RAPIDS	MI	GRR	AGL	ARTS2	04/10/90	12/04/90	10/15/88	10/15/88
MADISON	WI	MSN	AGL	ARTS2	/ /	09/30/93	10/15/88	10/15/88
WACO	TX	ACT	ASW	ARTS2	/ /	11/30/93	10/15/88	10/15/88
DEPO (FAATC SYS 2)	OK	N/A	AAC		/ /	/ /	10/31/88	10/31/88
FAATC SYS 1	NJ	N/A	ACT		/ /	/ /	10/31/88	10/31/88
FARGO	ND	FAR	AGL	TPX42	/ /	02/04/91	11/15/88	11/15/88
SIOUX CITY	IA	SUX	ACE	TPX42	/ /	10/31/93	11/15/88	11/15/88
MOSES LAKE	WA	N/A	ANM	TPX42	12/30/87	/ /	12/15/88	12/15/88
PASCO	WA	N/A	ANM	TPX42	12/20/87	/ /	12/15/88	12/15/88

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**TABLE 4. SITE INTERDEPENDENCY MATRIX ARTS IIA/MALA/MODE S/ASR-9  
(IN ALPHABETICAL ORDER)**

SITE	STATE	LOCATION ID	REGION	TERMINAL SYSTEM	DATE RECEIVE NEW ASR-9	DATE RECEIVE MODE-S	DATE RECEIVE ARTS IIA	DATE RECEIVE MODE-S/ASR-9 BOARD
ABILENE-DYESS	TX	DYS	ASW	TPX42	/ /	04/04/91	07/15/88	07/15/88
ACADEMY DEPO RELOC	OK	ACC			/ /	/ /	12/31/86	02/16/88
ANCHORAGE	AK	ANC	AAL	ARTS2	/ /	12/31/93	08/15/88	08/15/88
ASHEVILLE	NC	AVL	ASO	TPX42	05/30/90	/ /	08/15/88	08/15/88
ATLANTIC CITY	NJ	ACY	AEA	ARTS2	05/20/90	/ /	11/30/87	12/01/88
AUGUSTA	GA	AGS	ASO	TPX42	/ /	06/30/93	07/15/88	07/15/88
AUSTIN	TX	AUS	ASW	ARTS2	06/20/88	05/04/89	03/14/88	03/14/88
BAKERSFIELD	CA	BFL	AWP	ARTS2	/ /	10/31/93	09/15/88	09/15/88
BANGOR	ME	BGR	ANE	ARTS2	/ /	04/04/91	07/31/88	07/31/88
BILLINGS	MT	BIL	ANM	TPX42	/ /	02/04/91	05/15/88	05/15/88
BISMARCK	ND	BIS	AGL	ARTS2	/ /	06/04/89	09/29/88	09/29/88
BRISTOL/TRI-CITIES	TN	TRI	ASO	ARTS2	/ /	05/04/89	08/29/88	08/29/88
CEDAR RAPIDS	IA	CID	ACE	TPX42	06/10/90	01/04/91	07/15/88	07/15/88
CHAMPAIGN	IL	CM1	AGL	ARTS2	/ /	08/31/93	05/31/88	05/31/88
CHARLESTON	SC	CHS	ASO	ARTS2	03/30/88	09/04/89	04/15/88	04/15/88
CHARLESTON	WV	CHW	AEA	ARTS2	/ /	05/31/93	09/29/88	09/29/88
CHATTANOOGA	TN	CHA	ASO	ARTS2	/ /	06/30/93	02/15/88	02/15/88
CLARKSBURG	WV	CKB	AEA	ARTS2	/ /	05/31/93	08/29/88	08/29/88
CORPUS CHRISTI	TX	CRP	ASW	ARTS2	/ /	05/04/89	02/28/88	02/28/88
DAYTONA BEACH	FL	DAB	ASO	ARTS2	05/10/90	/ /	02/28/88	02/28/88
DENVER FAATC R&D	NJ	N/A	ACT		/ /	/ /	02/16/88	02/16/88
DEPO (FAATC SYS 2)	OK	N/A	AAC		/ /	/ /	10/31/88	10/31/88
DOWN. FAA DEPO HOT	OK	N/A	AAC		/ /	03/04/89	11/26/86	02/16/88
DULUTH	MN	DLH	AGL	ARTS2	/ /	05/04/91	07/31/88	07/31/88
ERIE	PA	ERI	AEA	TPX42	/ /	11/30/83	08/15/88	06/15/88
EUGENE	OR	EUG	ANM	ARTS2	/ /	10/31/93	08/15/88	08/15/88
EVANSVILLE	IN	EVV	AGL	ARTS2	/ /	02/04/91	05/31/88	05/31/88
FAATC (POUGH)	NJ	N/A	ACT		11/15/87	07/04/87	12/12/86	02/16/88
FAATC REL M. LAKE	NJ	N/A	ACT		/ /	/ /	11/26/86	02/16/88
FAATC SYS 1	NJ	N/A	ACT		/ /	/ /	10/31/88	10/31/88
FARGO	ND	FAR	AGL	TPX42	/ /	02/04/91	11/15/88	11/15/88
FRESNO	CA	FAT	AWP	ARTS2	/ /	03/04/91	05/15/88	05/15/88
FT SMITH	AR	FSM	ASW	TPX42	/ /	05/04/91	05/15/88	05/15/88
FT WAYNE	IN	FWA	AGL	ARTS2	04/20/90	09/30/93	04/15/88	04/15/88
GRAND RAPIDS	MI	GRR	AGL	ARTS2	04/10/90	12/04/90	10/15/88	10/15/88
GREAT FALLS	MT	GTF	ANM	ARTS2	/ /	05/04/91	09/29/88	09/29/88
GREENBAY	WI	GRB	AGL	TPX42	/ /	02/04/91	05/15/88	05/15/88
GREENSBORO	NC	GSO	ASO	ARTS2	12/20/89	/ /	03/31/88	03/31/88
HARRISBURG	PA	HAR	AEA	ARTS2	01/20/90	10/04/90	03/14/88	03/14/88
HUNTINGTON	WV	HTW	AEA	TPX42	/ /	05/31/93	08/15/88	08/15/88
HUNTSVILLE	AL	HSV	ASO	ARTS2	06/06/87	/ /	06/15/88	06/15/88
JACKSON	MS	JAN	ASO	ARTS2	/ /	04/04/89	06/29/88	06/29/88
KNOXVILLE	TN	TYS	ASO	ARTS2	12/30/89	06/30/93	03/31/88	03/31/88
LAFAYETTE	LA	LFT	ASW	ARTS2	/ /	08/31/93	03/14/88	03/14/88
LAKE CHARLES	LA	LCH	ASW	ARTS2	/ /	04/04/91	06/15/88	06/15/88
LANSING	MI	LAN	AGL	TPX42	12/20/88	/ /	03/15/88	03/15/88
LITTLE ROCK	AR	LIT	ASW	ARTS2	/ /	08/04/89	02/28/88	02/28/88

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TABLE 4 (cont)

SITE	STATE	LOCATION ID	REGION	TERMINAL SYSTEM	DATE RECEIVE NEW ASR-9	DATE RECEIVE MODE-S	DATE RECEIVE ARTS 11A	DATE RECEIVE MODE-S/ASR-9 BOARD
LONGVIEW	TX	GGG	ASW	ARTS2	/ /	08/31/93	07/31/88	07/31/88
LUBBOCK-REESE	TX	LBB	ASW	ARTS2	03/10/90	10/31/93	02/15/88	02/15/88
MACON-WAR ROB	GA	WRB	ASO	ARTS2	/ /	03/04/91	05/31/88	05/31/88
MADISON	WI	MSN	AGL	ARTS2	/ /	09/30/93	10/15/88	10/15/88
MERIDIAN	MS	NMM	ASO	ARTS2	/ /	07/31/93	07/31/88	07/31/88
MIDLAND	TX	MAF	ASW	TPX42	/ /	01/04/91	02/15/88	02/15/88
MONROE	LA	MLU	ASW	ARTS2	/ /	08/31/93	07/15/88	07/15/88
MONTGOMERY-MAXWELL	AL	MXF	AWO	ARTS2	02/10/90	07/31/93	06/15/88	06/15/88
MOSES LAKE	WA	N/A	ANM	TPX42	12/30/87	/ /	12/15/88	12/15/88
OKC ACADEMY SYS-1	OK	N/A	AAC		11/06/87	02/04/88	11/30/86	02/16/88
OKC ACADEMY SYS-2	OK	N/A	AAC		/ /	/ /	11/26/86	02/16/88
PASCO	WA	N/A	ANM	TPX42	12/20/87	/ /	12/15/88	12/15/88
PENSACOLA	FL	PNS	ASO	ARTS2	/ /	05/04/88	02/15/88	02/15/88
PEORIA	IL	PIA	AGL	TPX42	/ /	09/30/93	06/15/88	06/15/88
PORTLAND	ME	PWM	ANE	ARTS2	/ /	03/31/93	06/15/88	06/15/88
RENO	NV	RNO	AWP	ARTS2	/ /	07/31/93	02/28/88	02/28/88
RICHMOND	VA	RIC	AEA	ARTS2	10/30/88	04/30/93	03/14/88	03/14/88
RIO GRANDE	TX	HRL	ASW		01/10/88	03/31/93	02/15/88	02/15/88
ROANOKE	VA	ROA	AEA	ARTS2	/ /	04/04/89	04/30/88	04/30/88
ROCHESTER	MN	RST	AGL	TPX42	/ /	09/30/93	09/15/88	09/15/88
SANTA BARBARA	CA	SBA	AWP	ARTS2	/ /	04/04/91	08/29/88	08/29/88
SIOUX CITY	IA	SUX	ACE	TPX42	/ /	10/31/93	11/15/88	11/15/88
SPOKANE	WA	GEG	ANM	ARTS2	/ /	03/04/91	04/30/88	04/30/88
SPRINGFIELD	MO	SGF	ACE	ARTS2	/ /	03/04/91	08/29/88	08/29/88
TALLAHASSEE	FL	TLH	ASO	ARTS2	/ /	06/04/91	07/15/88	07/15/88
TOLEDO	OH	TOL	AGL	ARTS2	06/10/88	/ /	04/15/88	04/15/88
WACO	TX	ACT	ASW	ARTS2	/ /	11/30/93	10/15/88	10/15/88
WICHITA	KS	ICT	ACE	ARTS2	02/28/88	06/04/89	02/28/88	02/28/88
WILKES-BARRE	PA	AVP	AEA	ARTS2	/ /	04/30/93	06/29/88	06/29/88
WILMINGTON	NC	ILM	ASO	ARTS2	/ /	05/04/91	09/15/88	09/15/88

TABLE 5. PROJECT CONTACTS

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TABLE 5. PROJECT CONTACTS (CONT)

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TABLE 5. PROJECT CONTACTS (CONT)

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TABLE 5. PROJECT CONTACTS (CONT)

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TABLE 5. PROJECT CONTACTS (CONT)

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Appendix 1

TABLE 5. PROJECT CONTACTS (CONT)

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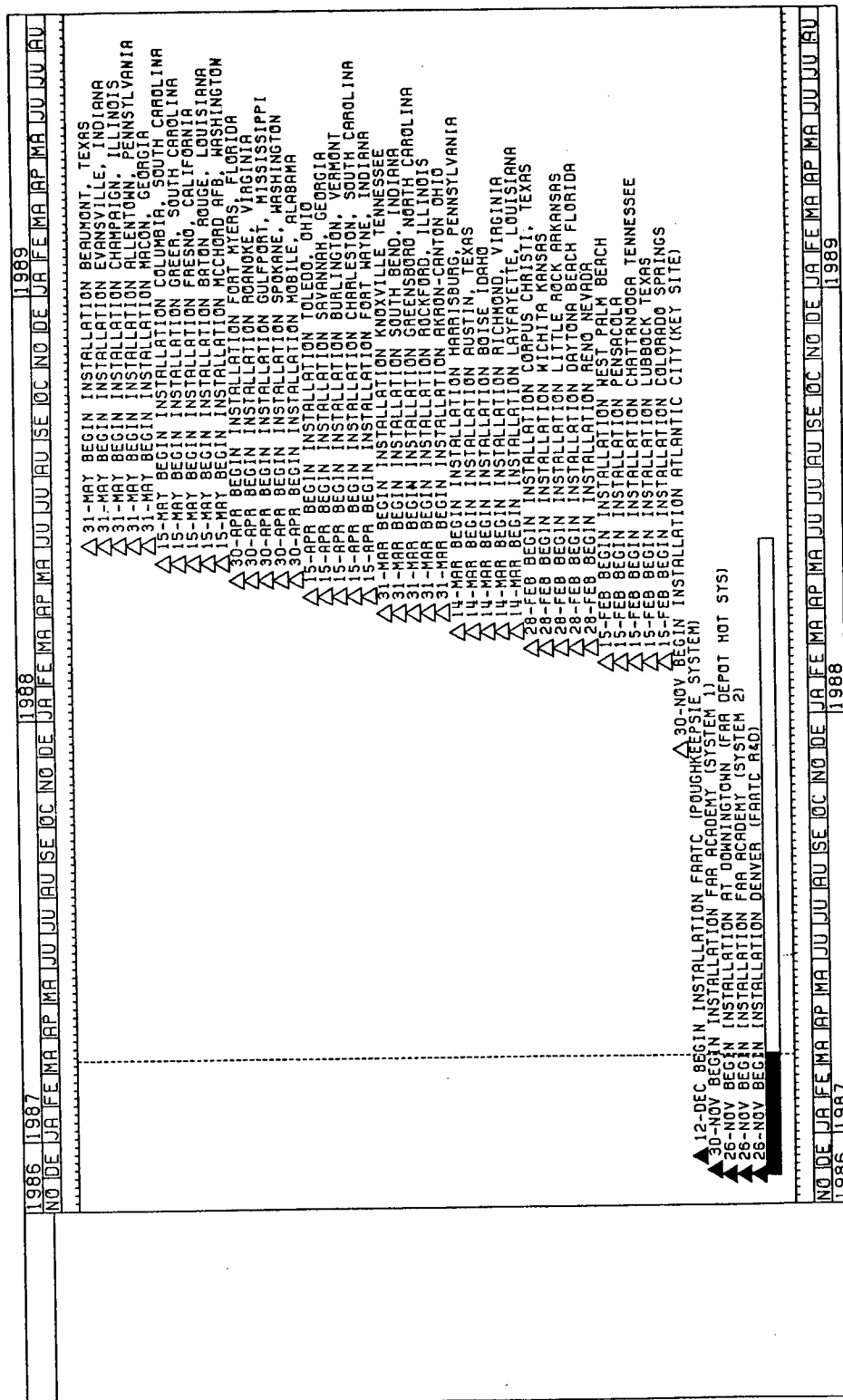
Ron Endicott, DC-3600  
475 School Street, S.W.  
Washington, D.C. 20024

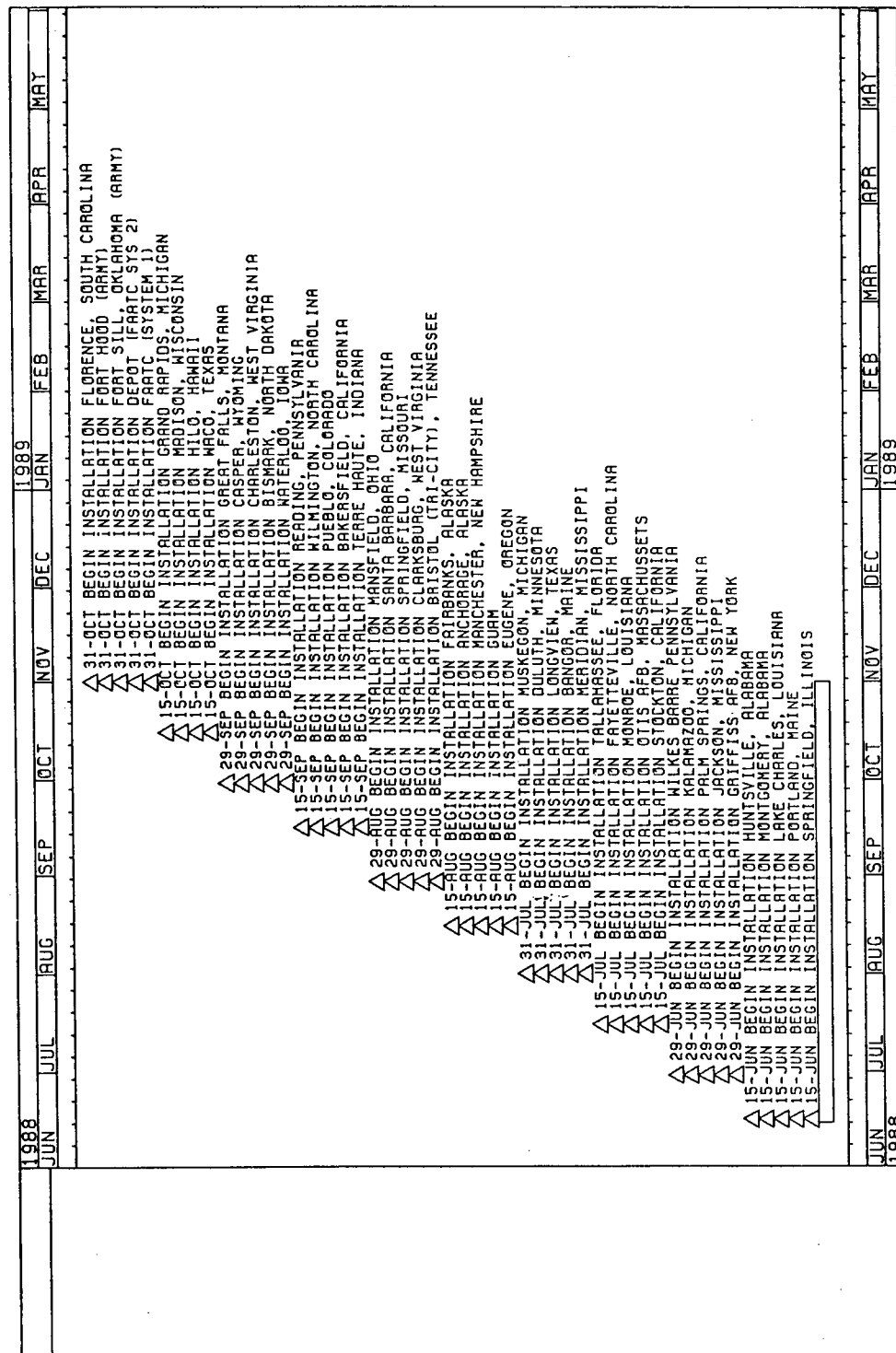
(202) 646-5855

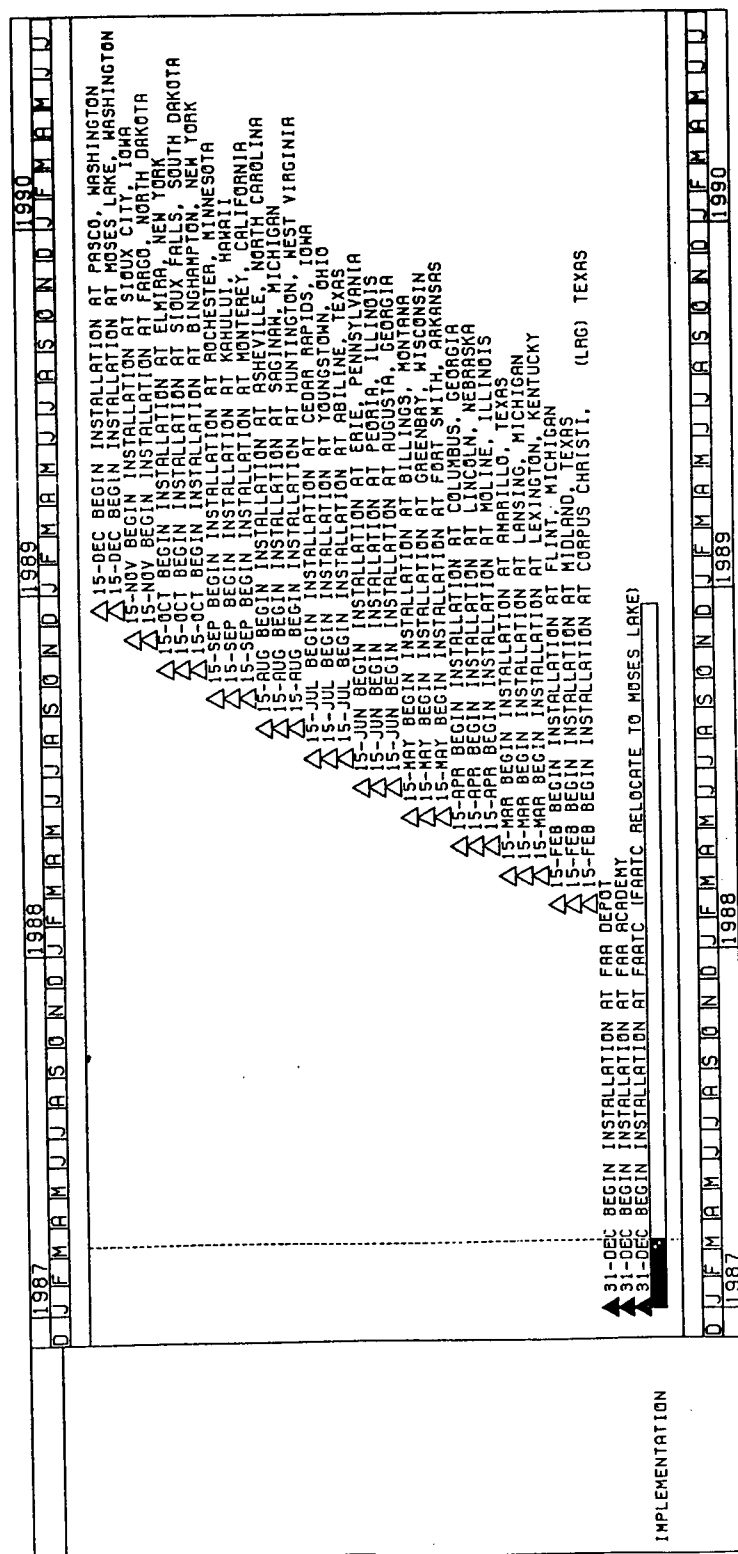
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APPENDIX 2

List of Documents Referenced in this PIP

DTFA01-82-6-10008 - ARTS II Enhancement Contract  
DTFA01-85-6-00040 - ARTS II Upgrade Contract  
TM-PA-(L)-0038/000/01 5 Feb 86 - Site Installation Planning Report  
TM-PA-0018/0072/00-2 - Mode S to ASR-7/ARTS IIA ICD  
TM-PA-0018/0072/00-1 - Mode S to ASR-8/ARTS IIA ICD  
TM-PA-(L)-0036/000/00 - Test Plan for ARTS IIA Upgrade and TPX-42 Replacement  
Order 6020.2A - Joint Acceptance Inspection for FAA Facilities  
Order 4800.2A - Utilization & Disposal of Excess & Surplus Personal Property  
FAA-E-2570B - DOT Federal Aviation Administration Specification ARTS IIA  
Order 1800.8E - National Airspace System Configuration Management





APPENDIX 3TPX-42 REPLACEMENT/DBRITE DEPENDENCY SOLUTION

When the TPX-42 Replacement program was first planned, the BRITE I, II & IV were the standard FAA tower displays. At the time these obsolete displays were scheduled for replacement by the DBRITE. It was decided that the DBRITE would be the standard tower display for the TPX-42 Replacement systems, and BANS would not be procured. The program schedules for the TPX-42 Replacement systems were being installed. A year plus delay in the award of the DBRITE contract slipped the delivery of the DBRITEs past the installation date of the TPX-42 Replacement. This left a gap of about four months from the projected delivery of the TPX-42 Replacement systems to when DBRITEs would be available.

To allow the installation of the TPX-42 Replacement systems with the required tower display and without long delays, the following plan has been adopted. Installation of the 33 TPX-42 Replacement systems at field sites are scheduled to begin in February 1988 (See Appendix 1 figure 2). The first 26 systems scheduled for installation are the TRACON configuration systems which require one tower display each. This requirement will be fulfilled by installing ARTS-II BANS temporarily until the availability of DBRITEs in June 1988. The BANS will be obtained from the following sources (1) eight BANS are currently in the Depot at OKC, (2) two are available from the FAATC, (3) one is available from the R&D system in Denver, and (4) five are available from regional units left over from TRACAB to TRACON conversions, and (5) ten will be available when five current TRACABs are converted to TRACON using RADS off the production contract. The Bans will be installed using regional resources funded by the ARTS-II program.

The six TRACAB systems will require tower displays but are not scheduled for installation until September 1988 which is three months after the first DBRITEs are scheduled for delivery. If the DBRITEs are late, then the TRACAB systems will remain in storage until DBRITEs are available. These systems will be the first to get DBRITEs. In addition some BANS may become available from regional sources between now and mid 1988 due to possible additional TRACAB conversions. These units would be used to install TRACAB systems as they became available.



APPENDIX 4ARTS IIA SITE CONFIGURATIONS

FACILITY	ST	ID	CTR	RADS	BANS	DBRT	KBD	TTY
# ACT (POUGHKEEPSIE)	OK	POU		5	1	1	12	43
ACADEMY 1	OK	OEX		2	1	1	3	37
ACADEMY 2	OK	OEX		1	0	0	2	37
SRDS/BURROUGHS	CO	DEN		3	1	1	6	43
DEPOT (BURROUGHS)	OK	DEP		1	1	1	2	37
DEPOT OPS SPARE	OK	DEP		0	0	0	0	
DEPOT RELOCATE	OK	DEP		11	0	0	12	43
ATLANTIC CITY	NJ	ACY	ZDC	4	1	1	7	43
CHATTANOOGA	TN	CHA	ZTL	4	1	1	6	37
COLORADO SPRINGS	CO	COS	ZDV	4	1	2	7	37
LUBBOCK	TX	LBB	ZFW	9	1	2	14	37
PENSACOLA	FL	PNS	ZJX	11	1	1	18	37
WEST PALM BEACH	FL	PBI	ZMA	6	1	1	9	37
FLINT	MI	FNT	ZOB	4	1	3	8	43
MIDLAND	TX	MAF	ZFW	4	1	1	8	43
LOWER RIO GRANDE	TX	HRL	ZHU	4	0	1	10	43
CORPUS CHRISTI	TX	CRP	ZHU	6	1	1	10	37
DAYTONA BEACH	FL	DAB	ZJX	5	1	1	7	37
LITTLE ROCK	AR	LIT	ZME	5	1	1	11	37
RENO	NV	RNO	ZOA	5	1	1	8	37
WICHITA	KS	ICT	ZKC	7	1	2	12	37
AUSTIN	TX	AUS	ZHU	8	1	2	13	37
BOISE	ID	BOI	ZSE	4	1	1	12	43
HARRISBURG	PA	CXY	ZNY	4	1	2	6	37
LAFAYETTE	LA	LFT	ZHU	5	1	1	7	37
RICHMOND	VA	RIC	ZDC	5	1	1	7	37
AMARILLO	TX	AMA	ZAB	4	1	1	8	43
LANSING	MI	LAN	ZOB	4	1	1	8	43
LEXINGTON	KY	LEX	ZID	4	1	1	8	43
AKRON/CANTON	OH	CAK	ZOB	5	1	2	7	37
GREENSBORO	NC	GSO	ZTL	6	1	2	13	37
KNOXVILLE	TN	TYS	ZTL	4	1	2	6	37
ROCKFORD	IL	RFD	ZAU	4	1	1	7	37
SOUTH BEND	IN	SBN	ZAU	5	1	1	9	43
BURLINGTON	VT	BTB	ZBW	5	1	1	8	37
CHARLESTON	SC	CHS	ZJX	5	1	1	8	37
FORT WAYNE	IN	FWA	ZAU	5	1	1	9	37
SAVANNAH	GA	SAV	ZJX	4	1	2	9	37
TOLEDO	OH	TOL	ZOB	5	1	1	9	37
COLUMBUS	GA	CSG	ZTL	4	1	2	8	43
LINCOLN	NE	LNK	ZMP	4	1	1	8	43
MOLINE	IL	MLI	ZAU	4	1	1	8	43

# FAA Technical Center (ACT)

ARTS IIA SITE CONFIGURATIONS (Cont)

FACILITY	ST	ID	CTR	RADS	BANS	DBRT	KBD	TTY
FORT MYERS	FL	RSW	ZMA	4	1	2	8	43
GULFPORT	MS	GPT	ZHU	3	1	1	5	37
MOBILE	AL	MOB	ZHU	4	1	1	6	37
ROANOKE	VA	ROA	ZDC	4	1	1	7	43
SPOKANE (FAIRCHILD AFB)	WA	GEG	ZSE	5	1	4	9	37
BATON ROUGE	LA	BTR	ZHU	4	1	2	12	43
COLUMBIA	SC	CAE	ZJX	4	1	1	8	37
FRESNO	CA	FAT	ZOA	4	1	1	8	43
GREER	SC	GSP	ZTL	4	1	2	8	37
MCCHORD AFB (TACOMA)	WA	TCM	ZSE	5	0	2	4	43
BILLINGS	MT	BIL	ZLC	3	1	1	6	43
FORT SMITH	AR	FSM	ZME	3	1	1	6	43
GREEN BAY	WI	GRB	ZMP	4	1	2	8	43
ALLENTOWN	PA	ABE	ZNY	4	1	1	7	37
BEAUMONT	TX	BPT	ZHU	2	3	2	8	37
CHAMPAIGN	IL	CMI	ZAU	4	1	1	6	37
EVANSVILLE	IN	EVV	ZID	4	1	1	7	37
MACON (ROBINS AFB)	GA	MCN	ZTL	4	0	2	5	37
HUNTSVILLE	AL	HSV	ZME	4	1	1	7	37
LAKE CHARLES	LA	LCH	ZHU	0	3	3	6	37
MONTGOMERY (MAXWELL AFB)	AL	MGM	ZTL	4	0	2	5	37
PORTLAND	ME	PWM	ZBW	4	1	1	7	37
SPRINGFIELD	IL	SPI	ZKC	4	1	1	8	37
AUGUSTA	GA	AGS	ZJX	3	1	1	6	43
ERIE	PA	ERI	ZOB	3	1	1	6	43
PEORIA	IL	PIA	ZOB	3	1	1	6	43
GRIFFIS AFB (ROME)	NY	RME	ZBW	4	0	2	5	37
JACKSON	MS	JAN	ZME	4	1	1	5	37
KALAMAZOO	MI	AZO	ZAU	3	1	2	5	37
PALM SPRINGS	CA	PSP	ZLA	0	3	3	4	37
WILKES BARRE	PA	AVP	ZNY	3	1	1	4	37
FAYETTEVILLE	AK	FAY	ZDC	4	1	2	8	43
MONROE	LA	MLU	ZFW	0	3	3	5	37
OTIS AFB (FALMOUTH)	MA	FMH	ZBW	6	0	2	7	37
STOCKTON	CA	SCK	ZOA	3	1	1	4	43
TALLAHASSEE	FL	TLH	ZJX	4	1	1	8	37
ABILENE	TX	DYS	ZFW	4	1	2	8	43
CEDAR RAPIDS	IA	CID	ZAU	4	1	1	8	37
YOUNGSTOWN	OH	YNG	ZOB	4	1	1	8	43
BANGOR	ME	BGR	ZBW	3	1	1	7	37
DULUTH	MN	DLH	ZMP	3	1	1	7	37
LONGVIEW	TX	GGG	ZFW	0	3	3	4	37
MERIDIAN	MS	NMM	ZME	5	1	1	9	37

ARTS IIA SITE CONFIGURATIONS (Cont)

FACILITY	ST	ID	CTR	RADS	BANS	DBRT	KBD	TTY
MUSKEGON	MI	MKG	ZAU	3	2	4	11	37
ANCHORAGE	AK	ANC	ZAN	6	1	4	10	43
EUGENE	OR	EUG	ZSE	4	1	1	6	43
FAIRBANKS	AK	FAI	ZAN	4	1	3	10	43
GUAM	GM	ZUA	ZHN	3	0	1	4	37
MANCHESTER (NASHUA)	NH	MHT	ZBW	3	1	2	6	43
ASHEVILLE	NC	AVL	ZTL	3	1	1	6	43
HUNTINGTON	WV	HTS	ZID	3	1	1	6	43
SAGINAW	MI	MBS	ZOB	4	1	1	8	43
CLARKSBURG	WV	CKB	ZOB	3	1	1	6	43
MANSFIELD	OH	MFD	ZOB	3	1	1	5	43
SANTA BARBARA	CA	SBA	ZLA	3	1	1	4	43
SPRINGFIELD	MO	SGF	ZKC	0	3	3	8	37
TRI-CITY (BRISTOL)	TN	TRI	ZTL	4	1	1	6	37
BAKERSFIELD	CA	BFL	ZLA	3	1	2	7	37
PUEBLO	CO	PUB	ZDV	0	3	3	5	37
READING	PA	RDG	ZNY	0	3	3	4	37
TERRE HAUTE	IN	HUF	ZID	3	1	1	5	43
WATERLOO	IA	ALO	ZAU	4	3	3	13	37
WILMINGTON	NC	ILM	ZDC	0	3	3	6	37
KAHULUI	HI	OGG	ZHN	0	3	3	0	43
MONTEREY	CA	MRY	ZOA	0	3	4	0	43
ROCHESTER	MN	RST	ZMP	0	3	3	0	43
BISMARCK	ND	BIS	ZMP	0	3	3	5	43
CASPER	WY	CPR	ZDV	3	2	3	7	37
CHARLESTON	WV	CRW	ZID	4	1	1	9	37
GREAT FALLS (MALMSTROM)	MT	GTF	ZLC	3	1	3	6	43
GRAND RAPIDS	MI	GRR	ZAU	4	2	1	12	43
HILO	HI	ITO	ZHN	0	3	3	4	43
MADISON	WI	MSN	ZOB	4	1	1	11	43
WACO	TX	ACT	ZFW	0	3	3	5	37
BINGHAMPTON	NY	BGM	ZNY	3	1	1	6	43
ELMIRA	NY	ELM	ZNY	0	3	1	0	43
SIOUX FALLS	SD	FSD	ZMP	0	3	3	0	43
DEPOT-HOT	OK	DEP		1	0	0	2	37
FAATC 1	NJ	TEC		3	1	1	4	37
FLORENCE	SC	FLO	ZJX	3	2	1	13	43
FORT HOOD AAB	TX	GRK	ZFW	4	1	1	5	37
FORT SILL AAB	OK	FSI	ZID	4	1	2	7	43
FARGO	ND	FAR	ZMP	0	3	3	0	43
SIOUX CITY	IA	SUX	ZMP	0	3	3	0	43
MOSES LAKE	WA	MWH	ZSE	4	0	1	10	43
PASCO	WA	PSC	ZSE	4	0	1	10	43
UNASSIGNED				3	2	2	6	43

